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BUREAU OF HYGIENE AND TROPICAL DISEASES.

TROPICAL DISEASES BULLETIN.

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BLACKWATER FEVER.

CALCUTTA: ANNUAL REPORT OF THE ALL-INDIA INSTITUTE OF HYGIENE AND PUBLIC HEALTH, 1936 [STEWART (A. D.), Director]. —[**Blackwater Fever** pp. 31–34] [KRISHNAN (K. V.)].

An epidemiological survey of blackwater fever has been conducted in 50 of the 155 tea-gardens situated in the Jalpaiguri Duars. About 98 per cent. of the population consist of Paharias and Madesias; the remainder are Chinese, Bengalees and Europeans. Between 1930 and 1936 a total of 132 cases of blackwater fever occurred in these 50 gardens. The distribution in the different groups of population of the 31 cases occurring in 1931 is shown in the following table:—

Group	Population	Cases of Blackwater Fever
Europeans	112	1
Bengalees	811	25
Chinese	49	2
Paharias	10,404	2
Madesias	43,940	1

The case mortality was about 20 per cent., all the deaths occurring among the Bengalees. Over 70 per cent. of the cases were adults about 20 years of age, and 15 per cent. were children below 10 years; the youngest patient was 2½ years old. About 80 per cent. of the cases occurred among those who had lived for over 3 years in the locality, and 80 per cent. of the cases occurred between May and September.

It is recorded that 8 of the 50 gardens were free from blackwater fever, and had produced no case of the disease within the past six years. Neither the nature of the population nor the intensity or type of malaria in these gardens differed in any way from that of neighbouring gardens noted for blackwater fever. The explanation of this interesting phenomenon is being sought.

A brief account is given of biological studies of the blood in cases of blackwater fever and in malarial haemoglobinuria of monkeys. The total cholesterol figures were lower than the normal values, while the figures obtained for organic phosphorus were, on the whole, higher

than the normal. These changes indicate that there is not only a derangement of the fat metabolism, but also, prior to haemolysis, there is an upset in the lecithin-free-cholesterol ratio.

The nature of biochemical changes observed in monkeys, prior to the onset of haemoglobinuria, suggested that these changes may be the result of a profound injury to the liver. Histological examinations of the liver and adrenals confirm this hypothesis and suggest the lines of treatment which may be profitably adopted.

Attempts were made to treat haemoglobinuric monkeys by correcting the observed biochemical and pathological changes or by preventing their occurrence. Treatments on the following lines were tried :—

" (1) Intravenous injections of glucose and insulin to correct if possible the deranged carbohydrate metabolism. (2) Injections of a colloidal solution of cholesterol to increase the free cholesterol content and prevent haemolysis. (3) Injection of compounds like glutathione which are known to bring about oxidation of fatty acids both *in vivo* and *in vitro*. (4) Injections of choline hydrochloride and choline phosphoric ester (synthesised in our laboratory). This line of treatment was suggested by the fact that choline is present in the spleen and that splenectomised monkeys show a greater incidence of haemoglobinuria. It is possible, therefore, that deficiency in choline in splenectomised animals plays a part in the causation of haemoglobinuria. (5) Injection of cortin and ascorbic acid to make up for the degenerative changes observed in the adrenal cortex."

The author states that they have obtained encouraging results with a combination of glucose, ascorbic acid and cortin, and that of these cortin appears to be the most important. *W. Yorke.*

Bhattacharjee (Jagdish C.). **Black-Water Fever.**—*Med. Bull.* Bombay. 1938. Apr. 2. Vol. 6. No. 7. pp. 222–226.

A semi-popular description of the disease containing nothing new.

W. Y.

Voigt (E. M.) & Voigt (C.). **Haemoglobinaemia in Malaria.**—*Trans. Roy. Soc. Trop. Med & Hyg.* 1938. Mar. 17. Vol. 31. No. 5. pp. 539–548.

Barratt and Yorke (1909) attempted quantitative estimation of plasma haemoglobin upon finger blood from 14 cases of malaria, 17 cases of blackwater fever, and some controls, without finding significant increase in malaria.

Many years later, Yorke, Murgatroyd and Owen (1930), and Fairley and Bromfield (1933) improved the technique for quantitative estimation. The latter authors, in their conclusions, stated that malaria is unaccompanied by haemoglobinaemia, but foresaw that it might be found in cases of primary hyper-infection producing severe anaemia and intense jaundice, such as one occasionally encounters in the tropics.

The present authors in the course of work upon the aetiology of blackwater fever have examined a number of cases of malignant tertian malaria with respect to the haemoglobin content of the " true " plasma. An account is given of the technique employed, and it is

concluded that the apparatus used is sensitive to amounts of oxyhaemoglobin at least as small as 5 mgm. per 100 cc. of solution, and to amounts of methaemoglobin at least as small as 100 mgm. per 100 cc. of solution.

The authors have examined in this way the " true " plasma from 17 cases of malignant tertian malaria and from 25 cases other than malaria. Each of the control cases was checked by the absence of parasites in the blood. None of them had methaemoglobinaemia and in only 9 was oxyhaemoglobinaemia detected in amounts varying between 5 and 19 mgm. per 100 cc. of plasma.

All the malaria cases exhibited *P. falciparum* in thick or thin blood films. A few of the cases were primary infections, some were relapses, but the majority were re-infections. Nine showed no haemoglobin in the plasma, 4 showed traces (5 to 15 mgm. per 100 cc.) and the remaining 4 showed, as highest figures, 60, 42·5, 35 and 22·5 mgm. per 100 cc., respectively. In no case was methaemoglobinaemia observed. Two of the last 4 cases had a normal, or a subnormal, temperature when the oxyhaemoglobinaemia was detected.

In view of the fact that concentrations such as these have not hitherto been recorded in malaria, the authors give further details regarding the patients. These, which are mainly of a biochemical nature, are set out in tabular form. *W. Y.*

CASTLE (W. B.) & DALAND (Geneva A.). **Susceptibility of Mammalian Erythrocytes to Hemolysis with Hypotonic Solutions. A Function of Differences between Discoidal Volume and Volume of a Sphere of Equal Surface.**—*Arch. Intern. Med.* 1937. Dec. Vol. 60. No. 6. pp. 949–966. With 5 charts. [22 refs.]

This paper, which is of a technical nature, must be read in the original by those interested. The following are the conclusions :—

" Our results suggest that differences in the susceptibility of various types of erythrocytes to hemolysis with hypotonic solution of sodium chloride are due largely to differences in form and not to differences in osmotic behavior.

" The percentage increases in equilibrium volumes in hypotonic plasma of erythrocytes of widely different susceptibilities to hemolysis do not show significant differences.

" Direct microscopic observations indicate that (*a*) hemolysis of a given type of erythrocyte is associated with the assumption of a spherical form in hypotonic plasma and that (*b*) the more susceptible the erythrocyte to hypotonic hemolysis, the less hypotonic the plasma necessary to cause the assumption of a spherical form.

" An approximation to the percentage increase in volume necessary to cause hemolysis can be made by calculation of the percentage difference between the volume of the erythrocyte in isotonic plasma (V_o) and that of a sphere of equal surface (V_s).

" In correlations of the *relative* degree of susceptibility to hypotonic hemolysis of a series of types of erythrocytes with their respective volume, diameter or surface in isotonic plasma, the erythrocytes of hypochromic anemia and of chronic hemolytic jaundice present exceptions.

" When these correlations are made on the basis of the diameter-thickness ratio or when *absolute* values are calculated according to the formula $\frac{V_s - V_o}{V_o}$, the erythrocytes of hypochromic anemia and of chronic hemolytic jaundice do not present these exceptions.

" Differences in the time necessary to cause hypotonic hemolysis of different types of erythrocytes may possibly be explained by difference

in the percentage increase in volume of the discoidal form necessary to produce the spherical form in hypotonic solution."

W. Y.

HAM (Thomas H.). **Chronic Hemolytic Anemia with Paroxysmal Nocturnal Hemoglobinuria. Study of the Mechanism of Hemolysis in Relation to Acid-Base Equilibrium.**—*New England Jl. of Med.* 1937. Dec. 2. Vol. 217. No. 23. pp. 915–917. [10 refs.]

This paper gives the preliminary results of the study of the mechanism of haemolysis in 3 patients exhibiting the clinical syndrome of a chronic haemolytic anaemia associated with paroxysmal nocturnal haemoglobinuria (Marchiafava's disease). For details the paper must be consulted in the original.

The following summary is given :—

" It is apparent that the red blood cells of these patients, both in vitro and in vivo, are abnormally susceptible to hemolysis in plasma of increased acidity within the physiologic range of pH variation. A thermolabile factor essential for this hemolysis was found in the patients' plasmas and serums and in the plasmas and serums of normal subjects. This hemolytic system differs from that of paroxysmal hemoglobinuria from cold (Donath-Landsteiner reaction) in the following respects : (1) hemolysis occurred without previous chilling ; (2) the essential abnormality resided in the red blood cells ; (3) the plasmas showed no apparent abnormality or hemolytic action on normal cells ; (4) the plasmas of normal subjects exhibited the same behavior as the plasmas from the patients ; (5) since the addition of complement did not re-activate the heated serums, the hemolysis described above did not depend upon an antigen-amboceptor-complement system. Because the red blood cells of these patients showed a normal resistance to hemolysis by hypotonic salt solutions, the abnormality characteristic of congenital hemolytic jaundice was not present.

" The oral administration of acid-forming salts clearly increased intravascular hemolysis. Although the oral administration of alkaline salts decreased intravascular hemolysis, withdrawal of alkali produced such striking and prolonged elevations of hemoglobinemia and hemoglobinuria that it is considered inadvisable as a therapeutic measure.

" In one patient, previous splenectomy apparently had not altered the fundamental abnormality of the red blood cells or significantly decreased the anemia, but had eliminated the increased hemoglobinuria during sleep. It is probable that the slight decrease in the pH of the peripheral blood during sleep may not entirely reflect the acidity of certain regions of the body which results from the relatively inactive circulation at such times. Destruction of red blood cells is thought to occur within the splenic pulp, where anatomic and physiologic observations have demonstrated an ample opportunity for circulatory stasis to occur. Therefore, it appears likely that splenectomy in one patient had removed an organ which in the other two patients may provide a region with sluggish circulation and consequently with a pH materially lower during sleep than that of the general circulation."

W. Y.

DACIE (J. V.), ISRAËLS (M. C. G.) & WILKINSON (J. F.). **Paroxysmal Nocturnal Haemoglobinuria of the Marchiafava Type.**—*Lancet.* 1938. Feb. 26. pp. 479–482. With 1 chart. [41 refs.]

This is an interesting paper dealing with the mechanism of production of haemoglobinuria in the condition known as paroxysmal nocturnal haemoglobinuria of the Marchiafava type. The chief characters of this condition are an anaemia of a chronic haemolytic

type, associated with jaundice and persistent haemoglobinaemia. The haemoglobinuria is most severe at night. The anaemia varies according to the severity of the haemoglobinuria.

Hamburger and Bernstein in 1936 reviewed the clinical features in detail, quoting 22 recorded cases and two of their own ; Witts (1936) also described a case and gave references of 12 others. Splenectomy and other forms of treatment appeared to have little permanent value.

The authors describe in considerable detail the case history of a patient who came under their own care. They also give an account of the serological investigations made on this case. These investigations, which are of considerable interest, must be consulted in the original.

The following is the summary :—

" In a case of paroxysmal nocturnal haemoglobinuria of the Marchiafava type, autohaemolysis has been demonstrated in vitro and shown to be dependent upon the pH of the system. The optimum pH for lysis is approximately 7·0–7·2, and it could not be produced at a pH greater than 7·8.

" Autohaemolysis of whole blood will occur at 37°C. without preliminary chilling.

" It is suggested that the patient's red cells are sensitive to a potential lysin present in normal sera. The interaction between the patient's red cells and this lysin is probably responsible for the clinical picture of severe haemolytic anaemia with nocturnal haemoglobinuria."

W. Y.

Batschwaroff (W.). Hämoglobinurie bei Icterus haemolyticus. [**Haemoglobinuria in Haemolytic Icterus.**]—*Deut. Med. Woch.* 1938. Feb. 4. Vol. 64. No. 6. pp. 191–192. [12 refs.]

Details are given of a case of haemolytic icterus associated with haemoglobinuria. This is an extremely rare occurrence ; the haemoglobinuria was observed during a severe haemolytic crisis for which no definite cause was discovered. Blackwater fever and drugs could be excluded. The author considers that the occurrence of haemoglobinuria must be ascribed to a combined effect of a peculiar constitution and other at present unknown factors. *W. Y.*

Landor (J. V.). **Blackwater Fever or Lederer's Anaemia ?**—*Jl. Malaya Branch Brit. Med. Assoc.* 1937. Dec. Vol. 1. No. 3. pp. 184–187.

The author believes that certain cases diagnosed as blackwater fever may be the acute haemolytic anaemia of Lederer, and that in these cases the use of blood transfusion as treatment is likely to be successful.

Details are given of a case of febrile haemoglobinuria in a Chinese boy aged 6 years. Rapid improvement followed blood transfusion. Landor appears to be of the opinion that the case might equally well be blackwater fever or Lederer's anaemia. *W. Y.*

Blackie (W. K.). **Blood Transfusion in the Treatment of Blackwater Fever.**—*Lancet.* 1937. Nov. 13. pp. 1124–1126.

The author, very rightly, begins his paper by stating a truth, which, although axiomatic, has been frequently disregarded by those who from time to time advocated various modes of treatment for blackwater fever. He writes " In assessing the value of any line of therapy in blackwater fever due attention must be paid to the average mortality-rate from the disease in any given area."

As the disease has been the subject of considerable investigation in Southern Rhodesia, a certain number of statistics are available. THOMPSON (1924) records an average death-rate of 23·53 per cent. in a series of 1,058 cases, and ROSS (1932) records a death-rate of 22·20 per cent. amongst 679 cases. Examination of the figures quoted by Thomson and by Ross shows that significant fluctuations in the death rate occurred from year to year; this fact still further complicates the statistical evaluation of any method of therapy.

Blackie states that the present paper does not claim to be a statistical study of the value of blood transfusion in the treatment of blackwater fever, but constitutes a simple clinical study (extending over a period of 5 years) of the application of blood transfusion to the therapeutics of the disease. In all, blood transfusion was performed in approximately 50 cases of blackwater fever, but in only 22 cases was the treatment controlled personally throughout the whole of the illness. Fifteen of these 22 cases were treated in hospital, and the remainder in the patient's home in a country district. Thirteen of the 15 hospital patients recovered and 6 of the 7 country cases. Three deaths occurred in the patients suffering from anuria.

The conclusions are as follows :—

"Blood transfusion has been systematically employed in the treatment of blackwater fever in Southern Rhodesia over a period of five years. Even after due allowance has been made for the fluctuations in the fatality-rate from year to year, it is felt that blood transfusion is an important life-saving measure in this disease.

"It is important to realise, however, that if full value is to be derived from this line of therapy it must be instituted in the early stages of the disease and not delayed until the patient is moribund. During the haemolytic phase the body may be in considerable need of an emergency supply of red cells and, since there is evidence to show that the erythroblastic activity of the marrow is in abeyance at this time, the necessity for early transfusion is apparent.

"Secondly, the transfusions must be repeated until there is haematological evidence of active erythropoiesis. While there is no evidence to show that blood transfusion shortens the haemolytic phase of the disease there is equally no indication that it serves in any way to aggravate or prolong the haemolysis. On the other hand, the demonstrable benefits accruing from blood transfusion are such that the immediate effect on the active phase of the disease need not be regarded as a major consideration.

"Finally, while blood transfusion is not indicated in every case of blackwater fever it is predominantly useful in the toxic polyuric and in the relapsing type of case and in post-blackwater asthenia, whereas it is definitely contra-indicated in toxic anuric blackwater."

W. Y.

WATS (R. C.) & HARBHAGWAN (S. A. S.). **A Note on the Prevention of Haemoglobinuria in *P. knowlesi* Infections in *S. rhesus* by Methylene Blue and its Curative Value when Combined with Quinine Salts.** —*Records of the Malaria Survey of India.* 1937. June–Sept. Vol. 7. Nos. 2 & 3. pp. 179–183.

Experiments are recorded indicating that the use of methylene blue prevented the occurrence of haemoglobinuria in *rhesus* monkeys infected with *P. knowlesi*, and that when this substance was administered as a therapeutic agent, together with quinine, the result was better than that obtained with quinine alone.

P. knowlesi infections of *rhesus* monkeys are eminently suitable for testing the effects and utility of antimalarial drugs, because this parasite almost invariably causes the death of the animal and often produces haemoglobinuria in the terminal stages of the infection. MULLIGAN and SINTON (1933) state that "out of 120 infections, it has been found that death resulted in every case when treatment of the initial attack was withheld." More recent unpublished data from the Malaria Survey of India, Kasauli, show that of 254 *S. rhesus* infected with *P. knowlesi* and untreated, only 4 escaped death, and in the majority haemoglobinuria occurred. If treatment was not commenced early death resulted in spite of treatment; recovery rarely occurs when treatment is delayed until the third and fourth day of the attack.

In the first experiment, which was performed in August 1934, two monkeys were inoculated with *P. knowlesi*. In each case parasites appeared on the 7th day; and 3 days later, when about 70 per cent. of the red cells were affected, treatment was commenced. The control monkey was given 2 grains of quinine on each of two consecutive days and died with haemoglobinuria some hours after the second dose. The other monkey received the same doses of quinine, but, in addition, 5 cc. of a 1 per cent. solution of methylene blue intravenously on each occasion when the quinine was given. There was no haemoglobinuria, and it is stated that the monkey recovered and remained free from malaria for 4 months.

The second experiment, which was conducted in January 1937, was of a similar nature. The control animal, treated by quinine alone, developed transient haemoglobinuria, and died with scanty parasites in its blood. The second animal, which received methylene blue in addition to the quinine, did not develop haemoglobinuria, and parasites disappeared from its blood. It died a fortnight later from dysentery.

Details are also given of another experiment performed at the end of 1934. In this experiment one monkey, which was treated with methylene blue alone, died of the infection; the other monkey, which was given both methylene blue and quinine, recovered from the infection. It relapsed after a fortnight, but the treatment was repeated, and there was no further relapse during the observation period of three months. The following summary is given:—

"A small series of *rhesus* monkeys infected with *P. knowlesi* was treated with quinine sulphate alone, with methylene blue alone, and with a combination of these two drugs. The following inferences seem to be justified from these experiments:—

"1. When the infection is at its height, quinine administered alone may expedite the onset of haemoglobinuria which may or may not be present in untreated cases.

"2. The administration of methylene blue alone prevents the development of haemoglobinuria in monkeys but has no effect on plasmodia. When the latter drug is given simultaneously with quinine sulphate it cures *P. knowlesi* infection in *S. rhesus*, this combination of drugs being more potent than quinine alone."

W. Y.

YELLOW FEVER.

JAMES (S. P.). Renseignements sur la fièvre jaune reçus au cours des neuf mois finissant le 30 septembre 1937. [**Information on Yellow Fever received during the Nine Months ending Sept. 30th, 1937.**] —*Bull. Office Internat. d'Hyg. Publique.* 1938. Jan. Vol. 30. No. 1. pp. 45–53.

The number of cases of yellow fever during the nine months ending 30th September, 1937, are shown in the following table:—

South America.

Country	State	No. of localities with cases	No. of cases	No. of deaths
Brazil	Matto Grosso ...	7	32	15
	São Paulo ...	22	74	74
	Parana	1	2	2
	Minas Geraes ...	24	62	62
	Territ. d'Acre ...	1	2	2
	Pará	3	7	7
	Piauhy	1	1	1
Colombia	Meta	1	4	4
	Santander ...	5	8	8
	Boyaca	4	13	9
	Cundinamarca ...	2	4	4
Paraguay	Forests of N.W.	1	Present	
Peru	River Perené ...	1	33	13

Africa.

French W. Africa ...	Dahomey ...	1	2	2
	Ivory Coast ...	4	8	5
	Senegal	9	15	14
French Equat. Africa	Gabon	2	3	2
	Middle Congo ...	1	1	1
	Oubangui-Chari...	1	1	1
British W. Africa ...	Gold Coast ...	23	61	52
	Nigeria	9	16	9

It will be noticed that during this period there is an increase over the number of cases recorded last year. In the Gold Coast 14 cases, all fatal, occurred at Accra, 13 being Africans and one a Syrian. A special feature of this epidemic was the low *Aëdes* index, an examination of 7,700 houses giving only 74 breeding places. A further examination showed that these insects were breeding freely in abandoned wells, hidden by vegetation and detritus.

In Nigeria an epidemic in a missionary centre, affecting the Europeans, was preceded by a rise in the death-rate among the local African population without yellow fever being suspected.

The author gives useful summaries of recent work on the epidemiology, and the application of the mouse protection test. It is confirmed that in certain parts to the south-east of Kordofan, 70–80 per cent. of the inhabitants show yellow fever immune bodies in their blood; also a British medical officer and his Sudanese assistant who visited Kau during 1936, gave positive reactions, although the blood examined before their visit had been negative. During this visit the British doctor was confined to bed with a fever for four to five days.

Dr. FINDLAY has reported the vaccination of almost 600 persons by the use of attenuated tissue culture virus without immune serum. In no case was there any severe reaction. Dr. BAUER forwards details of the history and preparation of this tissue culture virus, which has been used for the vaccination of more than 5,000 persons in Brazil and about 1,000 in Colombia. With regard to the Brazil vaccinations, Dr. SOPER reports that a small proportion, " perhaps 5 per cent and certainly not more than 8 per cent," of these 5,000 cases have had a slight head-ache and sometimes a febrile reaction on the sixth or seventh day. It was very rare for any of these cases to be confined to the house, and in no case was the patient unwell for more than two days. The possibility of jaundice occurring as a late sequela of vaccination has been discussed previously. [See this *Bulletin*, 1938, Vol. 35, p. 119.] *E. Hindle.*

ANDRIEU (G. R. J. J.) & MAUVAIS (F. E. R.). Les acquisitions récentes concernant l'épidémiologie de la fièvre jaune. [**Recent Advances concerning the Epidemiology of Yellow Fever.**]—*Rev. Service Santé Milit.* 1938. Feb. Vol. 108. No. 2. pp. 179–204.

A general review of the subject.

[It is questionable whether any modern authorities will agree with the opening sentence of this article, to the effect that America is without doubt the original home of yellow fever, the available evidence being overwhelmingly in favour of its African origin.] *E. H.*

HANSON (Henry). La fiebre amarilla en el Perené (Dpto. Junín, Perú). [**Yellow Fever in Perené, Junín Department, Peru.**]—*Bol. Oficina Sanitaria Panamericana*. 1937. Nov. Vol. 16. No. 11. pp. 1041–1047. English summary.

From July 1921 until April 1937 no case of yellow fever had been recognized in Peru, but on April 14th, 1937, a serious outbreak of fever with high mortality was reported from Perené, Department of Junín. The author visited the district and in one week saw 71 patients, 10 of whom showed malaria parasites. However, in addition, clinical cases of yellow fever were seen at two plantations, and on a subsequent visit, two other cases. The disease is apparently the jungle type, and the improved roads and increased travel suggest that the coast of Peru is in danger of reinfection. Automobiles and trucks leave this area every other day for Lima and the coast, and can reach their destination within 24 hours of leaving the infected zone. On the other hand *Aëdes* is absent from the infected area, the disease being transmitted by other species of jungle mosquitoes. *E. H.*

Cazanove (F.). Etude sur un cas de fièvre jaune observé à Brazzaville. [**The Study of a Case of Yellow Fever observed at Brazzaville.**]—*Ann. de Méd. et de Pharm. Colon.* 1937. July–Aug.–Sept. Vol. 35. No. 3. pp. 625–648. With 5 charts.

A detailed account of a fatal case of yellow fever, with typical symptoms, occurring in a postal official at Brazzaville. The infection was traced to a colporteur arriving from the coast, and the low *Aëdes* index in Brazzaville is considered to be the explanation of its remaining an isolated case. *E. H.*

Ohlerich (Emil). Gelbfieberepidemie in Chile im Jahre 1912. [**The Yellow Fever Epidemic in Chile during 1912.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1938. Apr. Vol. 42. No. 4. pp. 174–176.

An historical account of an outbreak of yellow fever at Topocilla, a nitrate port in northern Chile. The infection was introduced by a marine engineer who was probably infected in Guayaquil, Ecuador, and in spite of all warnings was placed among other patients in the hospital where mosquito nets were little used. In a short time there were more than 100 yellow fever cases with a mortality of above 30 per cent. By the application of anti-mosquito measures the epidemic was brought under control. *E. H.*

Pestana (Bruno Rangel). Considerações epidemiologicas a respeito da febre amarella e da febre amarella sylvestre. [**Discussion of the Epidemiology of Urban and Rural Yellow Fever.**]—*Ann. Paulist. Med. e. Cirurg.* 1937. Nov. Vol. 34. No. 5. pp. 441–485.

The author presents the main features of the ordinary urban yellow fever and of the jungle type, quoting largely from the literature and concludes that in São Paulo the disease is now of the latter, rural type. *H. H. S.*

Aragão (Henrique de Beaurepaire). Epidemiologia e prophylaxia da febre amarella. [**Epidemiology and Prophylaxis of Yellow Fever.**]—1937. 30 pp. With 2 plates. Instituto Oswaldo Cruz, Rio de Janeiro.

Hoffmann (W. H.). La endemicidade da febre amarela, no continente africano.—Reprinted from *Rev. "Africa Méd."* Lisbon. 1935. Vol. 1. No. 9. pp. 69–84.

Jorge (Ricardo). La fièvre jaune selvatique au Brésil. [**Jungle Yellow Fever in Brazil.**]—*Bull. Office Internat. d'Hyg. Publique.* 1938. Jan. Vol. 30. No. 1. pp. 54–68. [Refs. in footnotes.]

A useful summary of information on the epidemiology of yellow fever in Brazil which should be read in its entirety. The author distinguishes three varieties of the disease, referred to respectively as urban, rural, and jungle yellow fever. The first two are stated to be transmitted exclusively by the agency of *Aëdes aegypti* and man is the reservoir. In the case of jungle yellow fever, however, wild animals constitute the reservoir, and the infection is transmitted by other kinds of mosquitoes. The most remarkable feature of jungle yellow fever epidemics is their extreme diffusion, and the fact that as a

general rule the disease avoids inhabited regions and occurs along mountainous routes. Most of the cases occur in February, March and April, following the three hot months of November to January. A similar distribution of cases occurred in the last epidemic of yellow fever in Rio de Janeiro. The jungle variety has a lower mortality than the urban form, and its clinical features are often difficult to recognize. *E. H.*

Aragão (Henrique de Beaurepaire). Relatorio sobre o problema da febre amarella sylvestre em S. Paulo. [**Jungle Yellow Fever in S. Paulo.**]—1937. 18 pp. Instituto Oswaldo Cruz, Rio de Janeiro.

Whitman (Loring) & Antunes (P. C. A.). **Studies on *Aedes aegypti* infected in the Larval Stage with the Virus of Yellow Fever.**—*Proc. Soc. Experim. Biol. & Med.* 1938. Jan. Vol. 37. No. 4. pp. 664–666.

Larvae of *Aëdes aegypti* were infected with yellow fever virus by placing them when half-grown in a suspension of blood serum from a *rhesus* monkey at the height of infection, mixed with an equal quantity of physiological saline solution. Pupation started 48 hours later and the pupae were washed and placed in tubes of clean water. The first 28 males that emerged were ground up and inoculated into a monkey which died of yellow fever after six days. Fifteen females fed on a monkey when four days old failed to produce infection, but ten days later 29 females from the same lot produced yellow fever, by bite, in another monkey.

In another experiment the larvae were immersed in a suspension of virus for 24 hours, then well washed and allowed to pupate in clean water, with similar results. The amount of virus in the males which emerged was found to increase from 284 units on the first day, to 72,500 units after seven days, and 127,500 after fourteen days. In addition four day-old females produced infection by bite.

Using the same technique, mosquitoes were infected with a mouse neurotropic strain of the French virus in its 530 to 540th passage in mice.

Larvae were also infected by placing the eggs in the virus suspension and removing the young larvae, a few hours after they had hatched, into fresh water. Three experiments in which the titre of virus was low were negative, but one lot immersed in a suspension containing 33,000,000 M.L.D. for mice per cc., was found to have retained the virus when the adults emerged seven to eight days later.

Attempts to transmit the virus through the eggs gave uniformly negative results. *E. H.*

Whitman (Loring) & Antunes (P. C. A.). **The Transmission of Two Strains of Jungle Yellow Fever Virus by *Aëdes aegypti*.**—*Amer. Jl. Trop. Med.* 1938. Mar. Vol. 18. No. 2. pp. 135–147. [11 refs.]

A demonstration of the transmissibility of two strains of jungle yellow fever virus by *Aëdes aegypti*, which is of interest, since in view of the widespread endemicity of jungle yellow fever it is surprising how rarely the virus seems to have been introduced into towns harbouring this mosquito.

Rhesus monkeys were infected with two strains of jungle virus, the M.A.J. strain, first isolated in May 1935 in Taquaral, Goyaz, Brazil, and the Suarez strain, isolated in June 1936, in Muza, Colombia. Mosquitoes were fed on infected monkeys and after varying incubation periods on normal animals. No difficulty was encountered in maintaining mosquito-monkey-mosquito passages, which have been carried through 17 passages in the case of the M.A.J. strain and 4 in the Suarez. The minimal incubation period, however, is about 14 to 15 days, which is much longer than for the Asibi strain of urban origin.

It is possible that this longer incubation period may play a part in limiting the importation of jungle virus into towns, since a greater percentage of infected insects would die before becoming infectious.

Of 27 monkeys infected with the M.A.J. strain 13 out of 17 survivors either had no fever, or first showed fever after the virus had practically disappeared from the blood stream. In the other 4 survivors and the 10 which succumbed, the onset of fever corresponded with the period of maximum circulating virus. It is possible that this delayed febrile response in non-fatal cases may not be a characteristic of jungle virus, as such, but related to the pathogenicity for *rhesus* monkeys of the particular strain of virus.

If the human response is of this nature, many cases brought to town for treatment would no longer be infectious for the local *Aëdes aegypti*, and this would reduce the frequency with which the jungle virus might invade urban centres. *E. H.*

WHITMAN (Loring) & ANTUNES (P. C. A.). **Studies on the Capacity of Various Brazilian Mosquitoes, representing the Genera Psorophora, Aedes, Mansonia, and Culex, to transmit Yellow Fever.**—*Amer. Jl. Trop. Med.* 1937. Nov. Vol. 17. No. 6. pp. 803–823. [18 refs.]

A record of transmission experiments with various Brazilian mosquitoes, in most cases using the virulent Asibi strain of yellow fever, but in a few instances a Brazilian jungle strain (M.A.J.). The authors also include the results of experiments completed by Nelson C. DAVIS before his death in 1933.

The results confirm previous observations that *Aëdes scapularis* and *A. fluviatilis* are efficient vectors of yellow fever. *Aëdes nubilis*, *A. terrens*, *Mansonia justamansonia*, *M. fasciolata*, *M. chrysonotum* and *M. albicosta* failed to transmit the infection by bite, but the virus is retained in their bodies over long periods, as determined by inoculating their contents into susceptible animals.

The authors were unable to repeat Davis's transmission by the bite of *Aëdes taeniorhynchus*, and although the virus persists for long periods in the body of this mosquito, they incline to the view that it is not a vector.

The results with *Psorophora ferox* were confusing, for although Davis was able to transmit yellow fever by the bite of this mosquito, the authors were unable to confirm these observations, but suggest the possibility of there being different races of this species varying in their capacity to transmit the disease.

Experiments carried out by Davis with *Aëdes fulvithorax* and *Culex nigripalpus* indicate that these species are unable to transmit yellow fever by bite and also are obviously inefficient vectors since in most instances injection experiments were also negative. *E. H.*

ANTUNES (P. C. A.) & WHITMAN (Loring). **Studies on the Capacity of Mosquitoes of the Genus Haemagogus to transmit Yellow Fever.**—*Amer. Jl. Trop. Med.* 1937. Nov. Vol. 17. No. 6. pp. 825–831. [10 refs.]

The efficiency of forest mosquitoes belonging to the genus *Haemagogus* as carriers of yellow fever is now of especial importance in view of the possibility of their being concerned in the spread of the jungle variety of the disease.

Experiments were made with two species, but owing to the short life of these mosquitoes in captivity, the interval between the infected meal and testing their infectivity was not extended beyond 16 days, and it is well known that in some species (*e.g.*, *Culex thalassius*) a much longer interval may be required.

Haemagogus janthinomys was found to retain the Asibi strain of virus in its body for at least two weeks, but only one out of six feeding experiments gave a positive result. N. C. DAVIS also found that the virus persisted for at least 19 days in this species, but his mosquitoes refused to feed after incubation periods of 16 to 19 days. One specimen of *H. uriartei* retained the M.A.J. strain of jungle fever virus in its body for 16 days, but did not produce infection when fed on a susceptible monkey on the 16th day. *E. H.*

VAN DEN BERGHE (Louis). L'immunité amarile de sérums prélevés chez des ictériques en Ubangi (Congo Belge). [**Yellow Fever Immunity in Serum collected from Cases of Jaundice in Ubangi (Belgian Congo).**]—*Ann. Soc. Belge de Méd. Trop.* 1937. Dec. 31. Vol. 17. No. 4. pp. 577–579.

The examination of sera from 36 cases convalescent from jaundice in Ubangi, by means of the mouse protection test, gave 12 positives, 8 uncertain and 16 negative for yellow fever immune bodies, but of 73 control sera from persons living in the same villages but not having a history of jaundice, 19 were positive, 12 uncertain and 42 negative.

The results are difficult to interpret, but the author considers that one can reasonably state that the sum total of positive tests as well as the clinical evidence, excludes the possibility of these cases of jaundice having a yellow fever origin. *E. H.*

VAN DEN BERGHE (Louis). Sur l'existence d'une immunisation amarile récente chez des enfants du Bas-Congo. [**The Existence of Recent Immunization against Yellow Fever among Children of the Lower Congo.**]—*Ann. Soc. Belge de Méd. Trop.* 1937. Dec. 31. Vol. 17. No. 4. pp. 581–582.

The examination of 51 sera collected from children at Matadi gave 3 positives, one from a 14 year old child. Sixty-three sera from children at Banana, Boma and the neighbourhood gave 11 positives [ages not stated]. *E. H.*

BABLET (Jean) & BLOCH (Françoise). Sur le diagnostic différentiel de la fièvre jaune et la recherche d'un critérium histologique de cette affection. [**The Differential Diagnosis of Yellow Fever and the Search for a Histological Criterion of this Affection.**]—*Ann. Inst. Pasteur.* 1937. Nov. Vol. 59. No. 5. pp. 492–516. With 4 coloured figs. on 2 plates & 5 text figs. [46 refs.]

The authors, in the light of their own observations on material from cases of yellow fever occurring in the French West African possessions,

pass in review the various pathological changes previously described in yellow fever. The conclusion is drawn that the lesions in the heart, kidney and spleen are not sufficiently specific to serve as diagnostic criteria. These can be found only in the liver. In order to examine liver satisfactorily, tissues should be fixed in formalin for frozen sections. If the liver cells show dissociation and fatty degeneration, pieces of tissues should be placed for twelve hours in alcoholic picric-formol and then embedded in paraffin. The absence of dissociation of the lobular cords, even when fatty changes are present, is thought to eliminate the diagnosis of yellow fever. Paraffin sections should be stained either with haemalum, eosin, safranin or by Mallory's haematoxylin phosphotungstic acid method. The most important diagnostic feature is believed to be the presence of Councilman lesions, hyaline necroses, in the cytoplasm of the liver cells, associated with the total disappearance of all nuclear chromatin. These lesions have not been found in a very large number of other conditions affecting the human liver. [In animals these lesions are found in association with other virus infections such as fowl pest, African horse sickness and Rift Valley fever. The last disease attacks man but human tissues from an acute fatal case have not yet been examined.] The presence of intranuclear inclusions in the liver cells clinches the diagnosis of yellow fever, but these inclusions are not always easy to demonstrate.

G. M. Findlay.

MONTENEGRO (João). Uniformização dos diagnosticos histo-pathologicos da febre amarella. [**Histopathological Diagnosis of Yellow Fever.**]—*Brasil-Medico.* 1938. Jan. 15. Vol. 52. No. 3. pp. 51–59. With 3 coloured figs. [51 refs.] English summary.

The author discusses the lesions observed in liver tissue taken by viscerotome from cases of yellow fever and arranges them in tabular form according to his opinion of their relative significance.

A. Capital lesion.
   1. Councilman-Rocha Lima's cell.

B. Necessary lesions (two or more).
   2. Zonal necrosis.
   3. Disorganization of the liver parenchyma.
   4. Medium-and micro-droplet fatty degeneration.
   5. Insulo-cytoplasmic necrosis.

C. Less valuable but rather common lesions.
   6. Nuclear changes (swelling, pycnosis, karyolysis, karyorrhexis, nucleolar multiplication, nuclear inclusions resembling tiny nucleoles, nuclear inclusions of the Torres type).
   7. Swelling of Kupffer's cells.
   8. Swelling of liver cells.
   9. Pigmentation.
   10. Cellular infiltration of the connective stroma.
   11. Sinusoidal dilatation.
   12. Hyperemia.
   13. Rarefaction necrosis.

Referring to a former publication (see this *Bulletin*, 1938, Vol. 35, p. 118) the author defines more minutely exactly what he means by the Councilman-Rocha Lima's cell. He states that the liver cell in yellow fever passes through a process of hyaline eosinophile necrosis in certain stages. The nucleus changes from blue to purple-red before disappearing and it is at this penultimate stage with the purple-red

to red nucleus that the cell is most characteristic and it is to the cell in this stage that he gives the name. What are called Councilman's hyaline bodies are the liver cells in any stage of hyaline necrosis. Coloured illustrations depict well the characteristic cells and the zonal and parenchymal necrosis. *H. H. S.*

Rickard (E. R.). Le service de viscérotomie dans la lutte contre la fièvre jaune au Brésil. (Analysé par Ch. Broquet.) [**The Viscerotomy Service in the War against Yellow Fever in Brazil.**]—*Rev. d'Hyg. et de Méd. Préventive.* 1938. Mar. Vol. 60. No. 3. pp. 175–184.

A general account by Ch. Broquet based on Rickard's paper. [See this *Bulletin*, 1937, Vol. 34, p. 686.] *E. H.*

Cumming (Hugh S.). Mesures de quarantaine contre la fièvre jaune. [**Quarantine Measures against Yellow Fever.**]—*Bull. Office Internat. d'Hyg. Publique.* 1938. Mar. Vol. 30. No. 3. pp. 536–537.

The Federal Government of the United States is giving financial support to the local public health authorities at Miami, Florida, to organize a campaign against *Aëdes* in that neighbourhood. They are also opposing a proposal to make Charleston, South Carolina, an airport terminus for the Pan-American Airways, in view of the favourable breeding sites for *Aëdes* in that district.

A special corps is being trained to undertake inquiries into the prevalence of this mosquito in the larger towns of the southern United States, and no airport of entry is permitted within twenty miles of any town with a high index for *Aëdes*.

The author records the finding of a live *Anopheles maculipennis* in a "Chinese clipper" arriving at Alameda from Honolulu, and consequently these air stations are being disinfested of all mosquitoes.

E. H.

Soper (Fred L.). Vacinação contra a febre amarela no Brasil, de 1930 a 1937. [**Vaccination against Yellow Fever in Brazil, 1930–37.**]—*Arquivos de Hig.* 1937. Nov. Vol. 7. No. 2. pp. 379–390. [15 refs.] English summary.

Dr. Soper gives an interesting account of the development of methods of yellow fever personal prophylaxis as carried out by the Service in Brazil from 1930 to the present. Between 1931 and 1935 fifty persons received human immune serum *plus* mouse-brain virus; in the following year 44 received human anti-serum followed by tissue-culture virus, and 231 the same virus with small doses of goat antiserum, in 1936–37, 795 received hyperimmune monkey serum and tissue-culture virus, and in 1937 more than 20,000 were injected (18,000 in Brazil) with tissue-culture virus alone [*i.e.* without immune serum, the virus was suspended in serum (?)].

The author concludes: "The results with human serum were good but could only be applied to small numbers. Further laboratory study is required before animal sera can be used satisfactorily. Vaccination with virus modified by prolonged growth in chick embryo tissue without serum has proven to be the method of choice." [See also Findlay & MacCallum, this *Bulletin*, 1938, Vol. 35, p. 119.] *H. H. S.*

Soper (F. L.) & Smith (H. H.). **Yellow Fever Vaccination with Cultivated Virus and Immune and Hyperimmune Serum.**—*Amer. Jl. Trop. Med.* 1938. Mar. Vol. 18. No. 2. pp. 111–134. [20 refs.]

A general summary of the results obtained by the Laboratories of the International Health Division of the Rockefeller Foundation in New York, Bahia and Rio de Janeiro, with the use of cultivated yellow fever virus and immune serum.

During 1935–1936, in Brazil, 44 people were vaccinated with human immune serum and a strain of virus cultivated in mouse embryo tissue. The results were satisfactory, but can be applied only to small numbers owing to the limited supply of serum and the cumbersome technique. A second lot of 234 persons were vaccinated with the same virus and various pools of immune goat serum. Although immunization was obtained, the method was unsatisfactory owing to the development of serum reactions and delayed febrile reactions with virus in the circulation.

During 1936–1937, 795 persons were vaccinated with hyper-immune monkey serum and the same tissue culture virus, but probably owing to the greater activity of the monkey antibodies there was a relatively high percentage of failures to immunize, which are attributed to the use of excessive quantities of antibody, resulting in complete inhibition of the virus.

Of especial interest is the occurrence of a delayed reaction of unknown aetiology occurring from two to eight months after vaccination, similar to that described by Findlay and MacCallum. [See this *Bulletin*, 1938, Vol. 35, p. 119.]

There is no satisfactory explanation for the pathogenesis of this reaction, of which the main symptom is jaundice. A group of 191 persons vaccinated at Campo Grande, Rio de Janeiro, with two pools of monkey sera and culture virus, showed no marked reactions during the 30-day post vaccination period, but 61, or 32 per cent., gave a history of more or less severe illness, with jaundice, during the period 2 to 8 months after vaccination. Thirty-four of them were confined to bed, but all recovered. On the other hand there were no reported cases of delayed jaundice in 428 persons vaccinated in Brazil with other pools of sera, and 192 persons vaccinated with one or more of the virus components used at Campo Grande. *E. H.*

Peltier, Durieux (C.), Jonchère (H.) & Arquié (E.). Action de la bile sur le virus amaril. Recherche d'une vaccination antiamarile par virus bilié. [**The Action of Bile on Yellow Fever Virus. Studies of Yellow Fever Vaccination with Virus treated with Bile.**]—*Bull. Acad. Méd.* 1937. Dec. 7. 101st Year. 3rd Ser. Vol. 118. No. 37. pp. 432–438.

The authors find that serum containing bile neutralizes yellow fever virus and consequently positive sero-protection tests in mice may be obtained with the serum in certain cases of jaundice. When the mixture of virus and jaundice serum is inoculated into mice without delay no neutralization takes place, but even after 45 minutes delay the virus content is reduced, and after about 4 hours neutralization is complete. It was found that not all sera possess this action, but only those containing total jaundice. When the jaundice is dissociated,

with pigments in the blood and urine, but absence of biliary salts, the serum has no more action on the virus than normal serum. It was found that a dilution of 1/40 ox-bile to normal serum neutralized approximately 5,000 M.L.D. per cc. of virus in 30 minutes, as determined by intracerebral inoculation into mice.

Two monkeys were inoculated with a dilution of 1/50 yellow fever virus (2,000 M.L.D.) after being exposed for 30 minutes to the action of 1/40 dilution ox-bile. One of these monkeys showed a slight febrile reaction on the 6th day and its serum contained yellow fever virus as determined by mouse inoculation. It is evident, therefore, that the virus is not killed by the bile, but only " enrobé " or coated.

Accordingly, two volunteers were inoculated with the bile-virus mixture and both developed a very high titre of yellow fever antibodies in their sera, without showing any febrile or other clinical symptoms. The mixture has subsequently been used for the vaccination of a number of individuals and only in three cases was there a slight febrile reaction, and in these cases yellow fever virus was recovered from the blood.

It is curious that if one uses either the phosphatic suspension of infected mouse brain, or the virus present in a Seitz filtrate, the bile destroys the virus completely, and the inoculation of such mixtures fails to stimulate the production of yellow fever antibodies. It would seem that the presence of brain tissue is essential for the production of this bile-coated virus. *E. H.*

Durieux (C.). Etude de treize souches de virus amaril isolées par inoculation intracérébrale de sang de malades à la souris blanche. [**A Study of 13 Strains of Yellow Fever Virus isolated by the Intracerebral Inoculation of Patients' Blood into White Mice.**]—*Bull. Acad. Méd.* 1937. Dec. 7. 101st Year. 3rd Ser. Vol. 118. No. 37. pp. 438–449.

The author has isolated 13 strains of yellow fever by the inoculation of the patients' blood into the brains of mice. This method affords a method of certain diagnosis, on condition that the nature of the isolated virus is confirmed by protection tests with yellow fever immune serum.

Mice seem to be preferable to monkeys for diagnostic purposes, since at advanced stages of the disease, they seem to be more susceptible to intracerebral infection than monkeys are to intraperitoneal inoculation. Neither the gravity of the disease in man, nor the time when the blood was collected (up to the 5th day of fever) seemed to influence the receptivity of the mice.

Certain strains of virus were found to be much more virulent than others as determined by the action of anti-sera. Yellow fever virus was found to persist in the blood of yellow fever patients up to the 5th day of fever, even approaching the death of the patient.

The author advances the hypothesis that in human cases of yellow fever, under the influence of the bile present in the serum, the virus loses its viscerotropic, but preserves its neurotropic, properties for longer periods. In the case of monkeys, where the ordinary pantropic virus persists in the blood and organs up till death, jaundice is said to be very little developed.

The results of the examination of the blood of subjects prior to yellow fever inoculation show that benign cases of the disease are

common among both Europeans and negroes in French West Africa. These cases constitute a serious danger, and emphasize the necessity of yellow fever vaccination for adequate protection. *E. H.*

SMITH (Hugh H.). **The Propagation of Yellow Fever Virus in Mouse Testicle.**—*Amer. Jl. Trop. Med.* 1938. Jan. Vol. 18. No. 1. pp. 77–84.

The author has succeeded in propagating four unmodified strains of yellow fever virus in mouse testes *in vivo*, by means of serial passages. The virus used included the highly virulent French and Asibi strains, a J.F. strain from the Brazilian jungle with moderate virulence in monkeys, and a strain known as A.F.B. with low viscerotropic and neurotropic properties. Infected monkey serum diluted 1 : 10 was inoculated into each testis in doses of 0·03 cc. The virus was found to multiply in the testis and to be present in highest concentration after about seven days. After then it gradually diminished and disappeared by about the twenty-first day. No generalized infection was produced and only slight local lesions were discernible. Immunity generally occurred after the intra-testicular inoculation of adequate amounts of virus, but this response was somewhat irregular.

Mouse testis seems to be quite as suitable as mouse brain for the isolation of virus from an infected animal. None of the strains showed any modification after passages in mouse testes. The French strain has now gone through 42 passages, the J.F. 38, the A.F.B. 23, and the Asibi through 20 mouse testis passages, but in no case has any modification of the pathogenicity of the virus been demonstrated. LLOYD and MAHAFFY [see this *Bulletin*, 1934, Vol. 31, p. 498] succeeded in maintaining a neurotropic virus in mouse testes through nine passages. *E. H.*

SOPER (Fred L.), BEEUWKES (Henry), DAVIS (Nelson C.) & KERR (J. Austin). **Transitory Immunity to Yellow Fever in the Offspring of Immune Human and Monkey Mothers.**—*Amer. Jl. Hyg.* 1938. Mar. Vol. 27. No. 2. pp. 351–363. [24 refs.]

The authors give the results of mouse protection tests with the sera of the offspring of human and monkey mothers immune against yellow fever.

The results with rhesus monkeys in Bahia confirm previous observations [see this *Bulletin*, 1934, Vol. 31, p. 840]. Seven baby monkeys born to immune mothers gave positive immune reactions when tested within twelve hours of birth. Although in some cases positive protection results were obtained at the end of four or five months, in others the initial immunity was lost within three months.

The following table gives the results of comparative tests with human maternal and placental bloods :—

	Mothers	Umbilical Cord	
		Positive	Negative
Positive	19	17	2
Negative	59	0	59
Total	78	17	61

These results clearly indicate that yellow fever antibodies pass through the placenta and do not necessarily come from the mother's milk. The duration of this initial immunity was tested in a small group of 11 babies in Rio de Janeiro. Five of the mothers were positive and six negative. The sera of their babies at one to ten days old all gave similar reactions to their mothers, *i.e.*, five positive and six negative. Four of the babies giving a positive reaction were re-examined after 99 to 110 days and all had become negative.

The results of protection tests with babies of less than one year of age and their mothers at Recife, Pernambuco, are given in the following table :—

	Mothers	Babies							
		Under 2 months		2–4 months		4–6 months		6–12 months	
		Pos.	Neg.	Pos.	Neg.	Pos.	Neg.	Pos.	Neg.
Positive	81	5	2	4	12	3	17	0	38
Negative	46	0	5	0	6	0	12	0	23
Total	127	5	7	4	18	3	29	0	61

From these results it is evident that the presence of yellow fever antibody in the baby's serum at birth depends on its presence in the mother's serum. This initial immunity present at birth seems to be entirely passive in character and disappears during the first few months of life, and susceptibility tests on monkeys after the initial immunity had disappeared failed to show any decrease in susceptibility. From an epidemiological point of view, the influence of maternal immunity on the results of protection tests in children may be disregarded after one year and probably after six months. Although the possibility of the transmission of yellow fever antibodies by the maternal milk has not been definitely excluded, it does not occur to an extent sufficient to prevent the disappearance of antibodies from the blood of nursing infants before the end of six months. *E. H.*

Stefanopoulo (G. J.) & Nagano (Y.) with the collaboration of R. Wassermann. Comportement de certaines espèces animales vis-à-vis de diverses souches de virus de fièvre jaune. Sensibilité du Cynocéphale (" Cynocephalus papio ") au virus neurotrope de souris ; état réfractaire de ce primate au virus atténué par culture " in vitro." [**The Behaviour of Certain Species of Animals towards Various Strains of Yellow Fever Virus. The Susceptibility of Baboons** (*Cynocephalus papio*) **to the Neurotropic Mouse Strain ; the Resistance of this Primate to Virus attenuated by Culture " in vitro."**]—*Bull. Soc. Path. Exot.* 1937. Dec. 8. Vol. 30. No. 10. pp. 892–899. [17 refs.]

Frogs and golden hamsters inoculated with neurotropic yellow fever virus showed no signs of any reaction. In the case of spermophiles inoculated intracerebrally, the virus was recovered from the brain

five days later, and a second passage was successful, but an attempt at a third passage did not succeed.

Ferrets, a fox and two gazelles inoculated with the virus showed no signs of infection, but subsequently developed protective antibodies.

Two baboons (*C. papio*) were inoculated with viscerotropic virus, one a culture strain, but showed no obvious signs of infection, although they both developed specific antibodies in the blood. A third animal inoculated intracerebrally with neurotropic virus developed signs of encephalo-myelitis on the seventh day and died on the thirteenth day. Although no inclusion bodies were found in the brain, the histopathology showed characteristic lesions, and five mice inoculated with an emulsion of brain tissue and normal serum died of typical yellow fever encephalitis. *E. H.*

Findlay (G. M.). The Spread of Yellow Fever.—Reprinted from *Festschrift Bernhard Nocht z. 80. Geburtstag von seinen Freunden u. Schülern.* Hamburg. 1937. pp. 143–146.

de Assumpção (Lucas). O virus isolado dos doentes de febre amarella silvestre durante o ultimo surto epidemico verificado no estado de S. Paulo. [**The Virus isolated in the Recent Outbreak of Jungle Yellow Fever in São Paulo.**]—Reprinted from *Rev. Assoc. Paulista de Med.* S. Paulo. 1937. Nov. Vol. 11. No. 5. pp. 275–292. With 11 figs. English summary. [Boletim No. 61 Inst. de Hyg. de São Paulo.]

RELAPSING FEVER AND OTHER SPIROCHAETOSES.

Sautet (Jacques). Etiologie des fièvres récurrentes. [**The Aetiology of Relapsing Fevers.**]—*Marseille-Méd.* 1937. Sept. 25. Vol. 74. No. 27. pp. 273–284.

A useful summary of the subject containing the table reprinted overleaf showing the principal differences between the various species of relapsing fever spirochaetes. *E. Hindle.*

Chung (Huei Lan). **Filtrability of the Chinese Strain of** *Spirochaeta recurrentis*.—*Proc. Soc. Experim. Biol. & Med.* 1938. Feb. Vol. 38. No. 1. pp. 23–26.

The author found that the Chinese strain of *S. recurrentis* passes through Berkefeld filters "V" "N" and "W" under a pressure of 5 to 10 lb. to the square inch. Plasma containing numerous spirochaetes was used for the filtration experiments and the filtrates examined both by dark ground and animal inoculation. W filtrates and most N filtrates failed to show spirochaetes by direct examination, but the author considers that more direct evidence is needed to establish the existence of an invisible or granular form. *E. H.*

Baltazard (M.). Présence au Maroc d'un spirochète type *duttoni* transmis dans la nature par *Ornithodorus erraticus*. [**The Presence in Morocco of a Spirochaete of the Type** *duttoni* **transmitted in Nature by** *O. erraticus*.]—*Bull Soc. Path. Exot.* 1937. July 7. Vol. 30. No. 7. pp. 551–555.

From *Ornithodorus erraticus* collected in the burrows of rodents in Southern Morocco, the author has isolated three strains of spirochaetes which in their properties closely resemble *S. duttoni*. They were all highly pathogenic to rats, but in guineapigs produced only a non-apparent infection.

Cross immunity experiments with a Dakar strain of *S. duttoni* (var. *crocidurae*) gave only negative results, but in view of its pathogenic characteristics the author considers that it belongs to the Dutton group of spirochaetes. *E. H.*

Durieux (C.), Arquié (E.) & Carrière (Ch.). Un cas de fièvre récurrente hispano-africaine importé à Dakar. [**A Case of Spanish-African Relapsing Fever imported into Dakar.**]—*Bull. Soc. Path. Exot.* 1937. July 7. Vol. 30. No. 7. pp. 555–557.

The record of a sailor whose ship had called at Casablanca, where presumably he had become infected when visiting the native quarters. He was admitted to the hospital at Dakar suffering from an attack of relapsing fever and the spirochaete isolated from his blood, by its pathogenicity to guineapigs and also by cross immunity experiments, was shown to be *S. hispanicum* and not the local strain of *S. duttoni*.

E. H.

RELAPSING FEVER SPIROCHAETES.

Spirochaete	In Man.			Susceptible Animals.		Mammalian reservoir of infection.	Transmitting host.		
	No. of spirochaetes in blood	Relapses	Symptoms	Guineapig	Rats and Mice		Name	Transmitted by	Hereditary infection
S. recurrentis (*S. novyi*)	numerous	few = 1	variable mortality 5 to 80 p. 100	almost insusceptible	Infection of short duration (5–6 days) except for persistent brain infection	Man	*Pediculus humanus* 43 p. 100	crushing	variable* (±)
S. duttoni ...	fairly numerous especially in children	5 to 6	benign in adults severe in children mortality 5 to 50%	febrile infection	infections of long duration especially in the brain	Rodents rats shrews	*O. moubata* *O. savignyi* *O. erraticus*	coxal fluid	+
S. hispanica ...	rather uncommon	4 to 6	benign	febrile attacks spirochaetes numerous	id ,,	Pig rodents	*O. erraticus*	id	+
S. turicatae ...	rare	3 to 8	benign	young susceptible ; adults very little	susceptible, spirochaetes rare 2 relapses	rodents armadillo	*O. turicata* (*O. hermsi*)	bite	+ (60 p. 100)
S. venezuelensis	,,	3 to 8	+ benign − benign	—	slightly pathogenic	marmoset opossum armadillo	*O. venezuelense* *O. talaje*	coxal fluid bite	+
S. persica ...	,,	2 to 8	severe	71 p. 100 fatal cases with haemorrhagic peritonitis	+	rodents ? guineapig	*O. papillipes*	bite	+
S. normandi ...	experimentally (inapparent infection)			—	mice susceptible, rats less so	merion	*O. normandi*	bite	
S. sogdianum	experimentally			very susceptible (2–4 attacks)	slightly susceptible		*O. papillipes* exp. *O. moubata* *O. normandi*	bite	probable

* There is no satisfactory evidence in support of this view, as all experiments with lice have been negative.—Ed.

CHUNG (Huei Lan). **Presence of Spirochetes in the Urine and Prostatic Fluid of Patients with Relapsing Fever.**—*Proc. Soc. Experim. Biol. & Med.* 1938. Feb. Vol. 38. No. 1. pp. 97–98.

The urine of 27 (65·9 per cent.) of 41 patients infected with Chinese relapsing fever contained spirochaetes morphologically identical with *S. recurrentis*. To facilitate the search 10 cc. of urine was centrifuged at 2,000 to 2,500 revs. per minute for twenty minutes, and the sediment examined for spirochaetes. These were generally non-motile, but one out of six squirrels inoculated with sediment became infected after eighteen days. Viable and virulent spirochaetes were also recovered from the prostatic fluid of one out of two patients examined. This seems to be the first record of spirochaetes occurring in the urine or prostatic fluid of relapsing fever patients. *E. H.*

CHUNG (Huei-Lan). **The Cerebrospinal Fluid of Patients suffering from the Chinese Strain of Relapsing Fever.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1938. Apr. 20. Vol. 31. No. 6. pp. 625–634. [18 refs.]

A study of the cerebrospinal fluid of 26 patients suffering from the Chinese strain of relapsing fever, and all with negative Wassermann reactions, in order to exclude syphilis. Of these patients 9 had 1, 10 had 2, 6 had 3, and 1 had 4 examinations of the fluid obtained by lumbar puncture.

The physical properties of the fluids were generally normal, but in some cases there was a definite increase in the leucocyte counts, mainly in lymphocytes, and occasionally the pressure was augmented up to more than 210 mm. Pandy's test was weakly positive in 8 specimens, and Nonne's test positive in 4 specimens out of 50 examined.

The most striking result was the development of a transient but clear-cut positive Wassermann reaction in 9 out of 16 patients, which suddenly became negative 1 to 3 weeks later. This reaction is considered to be related to the relapsing fever infection.

Although spirochaetes were not seen in the dark ground examination of cerebrospinal fluid from 6 patients, the inoculation of 7 specimens of this fluid into 7 squirrels was followed by the development of relapsing fever infection in 5 of them. *E. H.*

JAHNEL (F.). Ueber das Verhalten von Rekurrensspirochäten im Organismus winterschlafender Tiere. [**The Persistence of Relapsing Fever Spirochaetes in the Bodies of Hibernating Animals.**]—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1938. Feb. 18. Vol. 92. No. 2/3. pp. 253–269. [21 refs.]

Dormice were found to be very susceptible to infection with both *Spirochaeta hispanica* and *S. usbekistanica*, and infection with the latter was often followed by persistence in the brain. When dormice were infected with these two strains and then placed in a cold room to induce hibernation, the spirochaetes disappeared from the organism much more rapidly than in control animals kept at ordinary temperatures. On the other hand, dormice inoculated with *S. hispanica* whilst in a state of hibernation, were still infected after 30 days uninterrupted sleep, showing that neither the lower body temperature, reduced metabolism, nor other (possibly hormonal) effects had been sufficient

to cause their disappearance. The fact that animals inoculated in the hibernating state remain infected longer than those inoculated some time before hibernation supports the view that in the latter animals the general protective mechanism of the body receives a stronger stimulus. The spirochaetes inoculated into hibernating animals do not multiply to the same extent and the body reaction is accordingly weaker.

Nevertheless, in the case of *Spirochaeta pallida* inoculated into hibernating dormice, all traces of the infection die out within 4 days, whilst control animals retain virulent spirochaetes for much longer periods.

The effect of hibernation on *S. pallida* is much stronger and quicker than in the case of relapsing fever spirochaetes. *E. H.*

Sibilia (Daniele). Tentativi di modificare sperimentalmente nel sangue periferico di ammalati di febbre ricorrente, i reperti spirochetici negativi. [**Attempts to facilitate Diagnosis of Relapsing Fever in Patients in whose Blood Spirochaetes are not found.**]—*Policlinico*. Sez. Med. 1937. Oct. 1. Vol. 44. No. 10. pp. 530–532.

The author tried by the use of adrenalin intravenously, 0·1 mgm., and of tuberculin subcutaneously, 0·5 cc. of 1 in 1,000 dilution, to throw into the circulation the spirochaetes of relapsing fever in patients whose blood—by smear or by thick drop—was negative to microscopical examination. The experiments were carried out on 22 Askaris in hospital at Addis Ababa. The attempts were unsuccessful; if none was seen by the usual method, none appeared after the injections.

Angelini, in a paper in the press [but quoted by the author, though apparently not yet published] has tried spleen puncture and examination of bone-marrow for the same purpose, but similarly without result. Since the blood of patients may be infective even though spirochaetes are not found, the author concludes that the organism passes through a phase when it is invisible, or ultramicroscopic.

H. H. S.

Feldt (Adolf). Ueber Interferenzversuche bei Spirochäteninfektionen. I. Brillantgrün, Solganal und Neosalvarsan. [**Interference Studies on Spirochaetal Infections. I. Brilliant Green, Solganal and Neosalvarsan.**]—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1938. Apr. 20. Vol. 92. No. 6. pp. 519–533. [24 refs.]

A further study of interference phenomena extending the observations of Bau Kien-Hun [see this *Bulletin*, 1938, Vol. 35, p. 127].

The author found that a fresh solution of Brilliant Green inoculated subcutaneously killed normal mice in dilutions of 1 : 1,500 in 24 hours, whilst mice heavily infected with *S. recurrentis* died after injections of 1 : 2,000 of the dye. It is a strong local irritant and subcutaneous injections are followed by the development of necroses in which a large part of the colouring matter is held back.

Solganal has a marked antagonistic action against Brilliant Green, and both normal and infected mice infected with lethal doses of this dye remain alive if 3–4 hours later they receive intravenous inoculations of 1 : 500 Solganal. Similar results were obtained with four

different strains of relapsing fever—*S. recurrentis*, *S. novyi*, *S. hispanica* and *S. usbekistanica*, but only when they showed similarly heavy infections. The negative results recorded by Kien-Hun are considered to be due to the different intensities of the infections in his experiments. It is also necessary to use the smallest curative dose of Solganal for each strain.

No antagonistic action was found between Brilliant Green and Neosalvarsan, and the curative dose of this drug was not affected by previous injections of the dye.

The interference phenomena between Brilliant Green and Solganal observed in mice infected with relapsing fever spirochaetes seems to depend on a functional injury of the protective mesenchyme system whereby the resistance of the host to the infection is lowered. The experimental results with Solganal support the view that this drug acts indirectly on the spirochaetes.

In the case of mice infected with trypanosomes the results of interference experiments are different, since there is a direct action of the drug on the parasite. *E. H.*

LEPTOSPIROSIS.

MEYER (K. F.), EDDIE (B.) & ANDERSON-STEWART (B.). **Canine, Murine, and Human Leptospirosis in California.**—*Proc. Soc. Experim. Biol. & Med.* 1938. Feb. Vol. 38. No. 1. pp. 17–19.

The study of a very fatal disease, affecting with increasing frequency the older dog population of San Francisco and the vicinity, revealed the presence of leptospira in the tissues. The post-mortem findings on 67 dogs arranged themselves into two groups, the Icteric type (33 individuals) corresponding to the so-called Weil's Disease, and the Haemorrhagic type (36 individuals) resembling Stuttgart Disease.

In spite of many efforts cultures of leptospira were obtained from only six dogs which were definitely jaundiced. These strains produced only transitory non-fatal infections in young guineapigs and neither the original tissues from 40 dogs nor several cultures, infected white mice and rats. These strains were identified by SCHÜFFNER as *L. canicola*, but in producing the development of icterus the Californian strain differs from the Dutch strain. A veterinarian infected with this Californian dog strain, showed a definite icterus and nephritis, and his serum eight months after recovery agglutinated *L. canicola* in a dilution of 1 : 300, and *L. icterohaemorrhagiae* in 1 : 30.

Typical Weil's disease has been diagnosed in San Francisco, and the random examination of the kidneys of 420 rats (*Mus rattus*, *M. alexandrinus* and *M. norvegicus*) by dark ground illumination gave 139 positive for leptospira (33 per cent.). In the vicinity of a stable 42 out of 44 old *M. norvegicus* were infected. Twenty-two strains isolated by guineapig passage, all produced fatal infections with jaundice after one, two or three passages. *L. canicola* was not found

in the rat population ; so that the host relationship of these two spirochaetes in California is almost certainly the same as in Holland, rats being the source of typical Weil's disease, and dogs the reservoir for *L. canicola* [see below.] *E. Hindle.*

WALCH-SORGDRAGER (B.) & SCHÜFFNER (W.). Die Selbständigkeit der *L. canicola*. [**The Individuality of** *L. canicola*.]—*Zent. f. Bakt.* I. Abt. Orig. 1938. Mar. 4. Vol. 141. No. 3/4. pp. 97–109. [18 refs.]

A valuable summary of the authors' observations on material collected mainly in the Netherlands during the past four years, showing the relative prevalence of various types of leptospira.

The serum reactions of 55 dogs examined during 1937 at Professor Klarenbeek's clinic in Utrecht are given in tabular form showing their reactions with a typical *canicola strain*, H. Utrecht IV, and a classical Weil strain, Wynberg. Thirty-one of the dogs known to be infected with *canicola* gave reactions with H. Utrecht IV strain to at least one-tenth the dilution of those with the Weil strain ; whilst of the 21 dogs infected with typical Weil's disease, reactions were obtained with the Wynberg strain in much greater dilutions than with *canicola*. In only three dogs were the reactions with the two strains indistinguishable.

Sixteen canine and three human strains of *L. canicola* isolated from the urine were tested with rabbit antisera against a typical Weil strain and *L. canicola*, respectively, and whilst the reactions with the latter were all positive in dilutions of 1 : 30,000, the reactions with Weil antiserum were never positive in dilutions of more than 1 : 3,000.

Infection with *canicola* seems to be commoner in dogs than Weil's disease, judging by the results of a serological examination of 48 dogs in Haarlem and the neighbourhood, by Dr. D. J. KOK. Twenty-six dogs, including all those under one year old (10) were negative, but of the remaining 22, 13 gave reactions indicating previous *canicola* infection, against 9 positive for typical Weil's disease.

With reference to the clinical symptoms in man Canicola-fever is distinguished from Weil's disease mainly by the absence of jaundice. In addition meningitic symptoms seem to be common and much more severe than in typical Weil's disease. In guineapigs, infection is rather less severe than *L. icterohaemorrhagiae*, but its virulence increases on passage. Seven died out of 28 animals infected directly from the urine of dog or man, whilst in the next passage 9 died out of 12. Only 2 out of 28 showed jaundice in the first passage, and in the second passage only two individuals.

When *Mus rattus*, *M. decumanus* and white rats were inoculated with *L. canicola*, the organisms persisted in the peritoneum for a few days but the urine never became infected, in marked contrast to Weil infections. It is evident that rats are not the carriers of *L. canicola*, a fact supported by the serological examination of 104 rat strains, none of which was identified as *canicola*, and the examination of rat sera from San Francisco, where the disease has been identified in dogs, gave similar results.

The disease seems to be essentially an epizootic of dogs, probably with a widespread distribution, from which man occasionally acquires the infection. *E. H.*

Tetzner (Ernst). Serologisch sichergestellter Fall von Weilscher Krankheit—Typ *Leptospira canicola*—beim Menscher unter dem Bilde einer Meningitis. [**The Serological Identification of a Case of Weil's Disease—Type** *Leptospira canicola*—**in Man, having the Appearance of Meningitis.**]—*Klin. Woch.* 1938. Apr. 2. Vol. 17. No. 14. pp. 508–509.

The description of a case of infection with *L. canicola* in a 41 year old woman in Hamburg, who almost certainly acquired the disease from a spaniel in her house that had been infected with Stuttgart Disease.

The symptoms were mainly meningitic, and there was no jaundice or colouration of the sclera. Agglutination and complement fixation reaction with *L. icterohaemorrhagiae* and *L. canicola* respectively were positive, with the latter in much higher dilutions, supporting the diagnosis of infection with the canine form of leptospirosis. The patient made an uninterrupted recovery. *E. H.*

Packchanian (A.). La spirochétose ictérohémorragique (maladie de Weil) aux États-Unis. [**Spirochaetal Jaundice (Weil's Disease) in the United States.**]—*Bull. Office Internat. d'Hyg. Publique.* 1937. Nov. Vol. 29. No. 11. pp. 2350–2353.

From time to time sporadic cases of Weil's disease have been observed in the United States, and it is probably more widespread than is generally believed. The author gives an historic review of various epidemics with symptoms suggestive of this disease and finds records of only eleven outbreaks between 1812 and 1886; but between 1880 and 1900 they become more frequent and in one year 51 epidemics were recorded.

The outbreaks often coincided with concentration of troops and generally occurred in autumn and winter, but in most of the cases there is only clinical evidence of the nature of the disease.

Wild rats are infected with the spirochaete in proportions varying from 4 to 30 per cent, and in addition the author found laboratory mice naturally infected with the strain. *E. H.*

Jolly (A.) & Danglemont (F.). Sur un cas de maladie de Weil à la Guadeloupe (spirochétose ictéro-hémorragique). [**A Case of Weil's Disease at Guadeloupe (Spirochaetal Jaundice).**]—*Bull. Soc. Path. Exot.* 1937. July 7. Vol. 30. No. 7. pp. 557–562.

The authors give details of a patient showing typical clinical symptoms of Weil's disease, associated with the presence of active spirochaetes in the urine. Nevertheless the inoculation of these organisms into guineapigs did not reproduce the infection.

This isolated case, from Pointe-à-Pitre, is the first record of Weil's disease from Guadeloupe. The infection is attributed to rats.

E. H.

Balard, Le Lourd & Duhart. A propos d'un cas de spirochétose ictéro-hémorragique ayant entrainé l'avortement chez une malade atteinte antérieurement d'une néphrite chronique. [**Concerning a Case of Spirochaetal Jaundice producing Abortion in a Patient previously Suffering with Chronic Nephritis.**]—*Gaz. hebd. Sci. Méd. de Bordeaux.* 1938. Apr. 10. Vol. 59. No. 15. pp. 229–233.

A detailed description of the symptoms of an abnormal case of infection with *L. icterohaemorrhagiae* in a pregnant woman who also suffered from chronic nephritis. There was little fever, no relapses, no jaundice or haemorrhages, and in spite of the serious renal condition, the azotaemia was not as high as in most cases of Weil's disease.

A pericarditis developed during the attack, but disappeared together with the spirochaetosis.

In a discussion of the nature of this pericarditis the authors incline to the view that it was of an infectious type, caused by the predisposing humoral condition resulting from the renal disease. *E. H.*

Kirk (R.). **Attempts to demonstrate Leptospirosis in the Northern Sudan.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1938. Apr. 20. Vol. 31. No. 6. pp. 667–670. [10 refs.]

Jaundice is a frequent clinical condition in the Sudan, but hitherto the spirochaete of Weil's disease has never been found in spite of the bacteriological and serological investigation of various outbreaks of sporadic jaundice.

A total of 259 rats in the Northern Sudan have been examined by dark ground illumination, guineapig inoculations and agglutination tests, but with uniformly negative results, so that it would seem that Weil's disease is either absent or extremely rare in this part of the world. It is possible that the arid desert environment is not favourable for the survival of the leptospira outside the body.

The jaundice occurring is apparently an infective type of unknown aetiology, but presents certain resemblances, especially in the histology of the liver lesions, to an obscure infective disease associated with jaundice described from Nigeria (see this *Bulletin*, 1931, Vol. 28, p. 858). *E. H.*

Blumenberg (W.). Ueber die Weilsche Krankheit als Laboratoriums- und Stallinfektion. [**Weil's Disease as a Laboratory and Stable Infection.**]—*Zent. f. Bakt.* I. Abt. Orig. 1937. Vol. 140. No. 3/8. Beiheft. pp. 100*–103*.

A description of three cases of Weil's disease, one fatal, among laboratory attendants. There were no details of the incubation period of the fatal case, but in the others it was 9, and 5 to 6 days respectively.

The infections were almost certainly acquired from rats, and in order to avoid such accidents the author recommends that great care should be taken to avoid the possibility of any experimental white rats coming into contact with wild rats. In all institutes where rats are kept, attention should be called to the danger of infection, and attendants should wear rubber gloves when handling them. Animal houses in which they are kept should be carefully labelled, and, finally, it is

recommended that cages containing rats should never be kept on shelves on a level with the face, because of the danger of contamination of the conjunctivae from infected urine. *E. H.*

Naftalin (Reuben). **Weil's Disease following a Motor-Car Accident.**—*Brit. Med. Jl.* 1938. Mar. 19. p. 621.

The record of a fatal case of Weil's disease following a motor car accident in which the car fell into a canal—the Fossdyke Navigation Canal near Lincoln. The patient swallowed a good deal of the canal water and required artificial respiration after being rescued. After five days he developed severe cramp-like pains in the legs, and five days later complained of sickness and malaise. He died twenty days after the accident and the post-mortem changes were typical of Weil's disease. *Leptospira icterohaemorrhagiae* was found in the liver, kidney and spleen, but not in the lungs. Two other passengers in the car, also half-drowned in this canal, made uneventful recoveries from the accident. *E. H.*

Reiter. Constatations nouvelles relatives à la maladie de Weil et à la gastroentérite hémorragique infectieuse des chiens (Stuttgarter Hundeseuche). [**New Facts concerning Weil's Disease and Infectious Gastroenteritis of Dogs (Stuttgart Disease).**]—*Bull. Office Internat. d'Hyg. Publique.* 1937. Nov. Vol. 29. No. 11. pp. 2343–2349.

The author gives the results of a serological examination of about 100 dogs suffering from undoubted "Stuttgart Disease," and states that in every case the serum contained antibodies against *Spirochaeta icterohaemorrhagiae*. However, many strains of leptospira were used in these tests, and the results obtained varied considerably with different strains. A polyvalent immune serum prepared from several strains was found to have a marked curative effect on dogs infected with Stuttgart Disease, especially when it was used at early stages of the disease.

There can hardly be any doubt that Stuttgart Disease in dogs is caused by the same pathogenic agent as Weil's disease, and occasionally the disease has been transmitted from dog to man. In some cases the serum of infected dogs did not react with *S. canicola*, or any other strains isolated from dogs, but only with human strains of *S. icterohaemorrhagiae*.

The author is of the opinion that all the Weil-type spirochaetes, including *S. icterohaemorrhagiae*, *S. canicola*, and *S. grippo-typhosa*, have a similar antigenic structure, but show many immunological variants. *S. hebdomadis*, on the other hand, is stated to present well marked differences, and to be a distinct species. *E. H.*

Asahina (Kazuo). Positive Hanganutziu-Deichersche Reaktion bei endemischem Fieber in Süd-Japan (*Tosa-Netsu*). [**Positive Hanganutziu-Deichersche Reaction in Endemic Fever in South Japan.**]—*Nagoya Jl. Med. Sci.* 1937. Oct. Vol. 11. No. 3. pp. 79–82.

A positive H.D. reaction is the agglutination of heterologous red cells by the sera of patients. This positive reaction has been noted in Europe in infectious lymphocytosis or glandular fever. Similar fevers are met with in Japan under various names in different districts

but all are types of glandular fever with sore throat and lymphocytosis among them being Hasami-netsu and Akiyami, spirochaetal diseases [see this *Bulletin*, 1936, Vol. 33, p. 59]. It was found by the author that the sera of these cases agglutinated the red cells of sheep. *D. H.*

RAT-BITE FEVER.

Das Gupta (B. M.). **Experiments on the Spirillum of Rat-Bite Fever.**—*Indian Med. Gaz.* 1938. Jan. Vol. 73. No. 1. pp. 14–17. With 2 figs. [20 refs.]

Three litters born of mice infected with *Spirillum minus* failed to show any signs of infection, and infection was not produced in mice by feeding them with urine containing the spirilla, or contaminated food. An infected male was kept with a normal female for several weeks, but neither this individual nor its offspring became infected.

Two experimentally infected human volunteers gave consistently negative Wassermann reactions, but four guineapigs infected from one of these cases all developed positive reactions.

A comparative study of the prevalence of the spirilla in the blood and peritoneal fluid of mice shows that the number of spirilla in the latter does not diminish appreciably over long periods, whilst there are marked fluctuations in the numbers in the blood.

An experimentally infected human volunteer, after three bouts of fever, was treated with arsphenamine and recovered. He was re-inoculated with the spirillum respectively two months and eight months later, but proved refractory to further infection.

E. Hindle.

Das Gupta (B. M.). **Spontaneous Infection of Guineapigs with a Spirillum, presumably *Spirillum minus* Carter, 1887.**—*Indian Med. Gaz.* 1938. Mar. Vol. 73. No. 3. pp. 140–141. With 1 fig.

The author, in the course of studies on leptospiral infections in guineapigs, found that 4 out of 42 harboured a natural infection with a spirillum morphologically identical with *S. minus*. Since both mice and guineapigs may be spontaneously infected with this organism, it would seem necessary to examine previously the peritoneal fluid of any animals used for diagnostic inoculation. *E. H.*

Russi (Szymon). Il passaggio dell'agente del sodoku nel latte. [**Presence of the Spirillum of Rat-Bite Fever in the Milk.**]—*Arch. Ital. Sci. Med. Colon. e Parassit.* 1938. Jan. Vol. 19. No. 1. pp. 14–18. With 1 fig.

The author injected pregnant rats and guineapigs subcutaneously and intraperitoneally with blood containing *Sp. morsus muris*. Subsequent examination of the milk of these animals revealed the presence of the organism—in smaller numbers than in the blood—and further inoculation into other animals showed that they were still pathogenic.

H. H. S.

MALARIA.

Andrews (Mary N.) & Chu (Tso-Chih). **Note on a Malaria Survey in Kiao-Chiao.**—*Chinese Med. Jl.* 1937. Dec. Vol. 52. No. 6. pp. 884–886.

Kiao-Chiao is in the municipal area of Greater Shanghai. The school children were examined in the summer, autumn and spring terms. Of the 7,766 bloods examined malaria parasites were found in 324, 4·2 per cent. The positive findings were highest in the autumn, 8·0 per cent, and lowest in the spring, 1·7 per cent. *Pl. vivax* was found in 281, *malariae* in 24, and *falciparum* in 19. A large proportion of the positive films contained gametocytes. *Norman White.*

Lega (G.), Raffaele (G.) & Canalis (A.). Missione dell'Istituto di Malariologia nell'Africa Orientale Italiana. [**Mission of the Istituto di Malariologia to Italian East Africa.**]—*Riv. di Malariologia.* Sez. I. 1937. Vol. 16. No. 5. pp. 325–387. With 7 plates (5 maps, 1 folding) & 17 figs. English summary.

During a four months tour the Mission carried out a preliminary survey of malaria conditions in Eritrea, Amhara, Shoa, Harrar and Somaliland. Malaria is widespread. At altitudes of 2,000 metres and upwards malaria is practically non-existent. At heights of 1,500 metres the disease occurs but is not severe : where it occurs *vivax* infections predominate. There are areas situated at altitudes of from 1,000 to 1,200 metres in which the disease is very prevalent and spleen indexes up to 90 per cent. are to be found. Here the epidemic seasons are from April to June and from September to November, and *falciparum* is more in evidence than is *vivax*. Similar conditions prevail on the eastern slopes at slightly lower altitudes. On the western slopes malaria is much less of a scourge and *vivax* infections predominate. An explanation of the lower prevalence here is probably to be found in the relatively few populated areas and the distance of some of these from anopheline breeding places. In the low-lying plains the prevalence of malaria, though high enough, is less than in the lower hills, and, in general, *vivax* infections are more frequent than *falciparum*. In the eastern plains *vivax* infections constitute from 60 to 75 per cent. of the total, the epidemic season extending from December to March : in the western plains *falciparum* infections occur more frequently, in some places contributing 50 per cent. of the total cases. In Somaliland *vivax* infections outnumber *falciparum* : here too the malaria seasons are April to June and October to November.

From the clinical point of view the authors state that the symptoms caused by *vivax* infections are commonly more severe than in Italy : on the other hand *falciparum* infections are apt to be relatively mild Certain *falciparum* cases harboured parasites with unusual features : these have been made the subject of another contribution in this number of the *Rivista* (see Raffaele & Lega, this *Bulletin*, 1938, Vol. 35, p. 418.

Anophelines are numerous and widespread. Circumstances did not permit a study of the habits and other biological characteristics of the anophelines found. The following species were collected : *cinereus, christyi, demeilloni, d'thali, funestus, gambiae, garnhami, mauritianus*

pretoriensis, rhodesiensis, squamosus, turkhudi and *walshi*. At high altitudes *cinereus* and *demeilloni* occur, the former predominating.

N. W.

PIETRO (Lavezzoni). Contributo allo studio della malaria dei tropici. [**Contribution to Study of Malaria in the Tropics.**]—*Giorn. Ital. di Clin. Trop.* 1938. Feb. 28. Vol. 2. N.S. No. 2. pp. 39–40, 43–6, 49–52, 55.

The author relates his experience of malaria in the lower and middle plains of western Eritrea. A general description is given of the country. Each year there is an increase of malaria prevalence at the beginning of the rains, in July, and after, September to November. *A. costalis* is the most important vector; *A. mauritianus* is less prevalent; *A. maculipennis* occurs. Three-quarters of the cases are *falciparum* infections, the remainder being mixed infections of *falciparum* and *vivax*. Malaria acquired in the lower plains is much more severe and more resistant to quinine than the malaria of the higher regions, at altitudes round about 1,400 metres. Thirty-three representative cases of the latter are briefly described, as are 27 cases of infection acquired in the lower plain, all European cases. Much space is given to a description of the treatment generally adopted which lacks nothing on the score of thoroughness. A complete course of treatment lasts more than two months and includes plasmoquine-quinine intramuscularly, quinine intravenously, atebrin by mouth, a series of intravenous neosalvarsan injections, plasmoquine by mouth, and a generous dosing of quinine by mouth. A time-table of this elaborate treatment is given. The results are stated to be good. *N. W.*

LÖRINCZ (Francis). **Malaria in Hungary.**—*Riv. di Malariologia.* Sez. I. 1937. Vol. 16. No. 6. pp. 465–479. With 2 figs.

Published information regarding the incidence of malaria in Hungary is almost non-existent, a fact which gives interest to this paper though the information it contains is somewhat scanty. Malaria was made a compulsory notifiable disease in Hungary in 1927. Four years later the State Institute of Hygiene undertook the free examination of blood smears from suspected cases of malaria. These two measures constitute the basis of the information recorded. Eighty per cent. of all cases notified have been reported from three counties in the north-east and from three counties in the south-west of the country. Elsewhere only sporadic cases have been notified. The highest number of cases notified in any one year was 1934: there were indications, however, that the 1937 total would exceed 4,000. The increase in recent years is probably due primarily to more complete notification. Of the positive smears examined in the Institute 91 per cent. were *vivax* and 8 per cent. *falciparum*. There is evidence that *A. maculipennis* vars. *typicus* and *messeae* are the most important vectors: *atroparvus* is found chiefly in the central plain, where it breeds in slightly brackish water and where malaria is rare. *N. W.*

SWELLENGREBEL (N. H.) & KRAAN (H.). Ueber die Malariamorbidität bei Säuglingen und Erwachsenen in Nordholland. [**Malaria Morbidity in Northern Holland in Children and Adults.**]—Reprinted from *Festschrift Bernhard Nocht z. 80. Geburtstag von seinen Freunden u. Schülern. Hamburg.* 1937. pp. 620–624. With 2 charts.

HOME (A. R.). **An Outbreak of Malaria on Shipboard.**—*Health.* Canberra. 1938. Jan. Vol. 16. No. 1. pp. 10–11.

An account of an outbreak of malaria of unusual severity on board ship. ss. *Trefusis* sailed from Cardiff with a cargo of coal for Dakar where she arrived at the end of September. She was in that port nine days; mosquitoes were very prevalent. Between 5 and 32 days after leaving Dakar there were 13 cases of malaria among a ship's company numbering 33. Two cases were fatal. The ship carried no surgeon but throughout her voyage to Australia *via* the Cape she was in wireless communication with passing ships carrying surgeons or with shore wireless stations from which medical advice could be obtained. *N. W.*

LEGENDRE (F. M. A.). Première enquête d'ensemble sur l'endémicité palustre au Cambodge. [**First General Inquiry on Malaria Prevalence in Cambodia.**]—*Ann. de Méd. et de Pharm. Colon.* 1937. July–Aug.–Sept. Vol. 35. No. 3. pp. 964–975.

Except for certain rubber plantations and a few towns little has been published hitherto concerning the intensity of endemic malaria in different parts of Cambodia. The present report is the first attempt to make good the deficiency. It records the results of the blood examination of groups of children, aged from 2 to 12, in different parts of the country. Cambodia, quadrilateral in shape, covers an area of 175,000 square kilometres, and is bordered by Siam, Laos, Annam, Cochin China and the Gulf of Siam. The central plain is magnificently watered by the Mekong and the Bassac.

From the present limited inquiry it appears that malaria is not very severe in Cambodia except for certain mountainous and wooded regions and along the shore of the Gulf of Siam; none of these intensely malarious regions are densely inhabited. The majority of the population live along the banks of the big rivers; here malaria occurs, but sporadically. *Pl. falciparum* and *Pl. vivax* both occur; *Pl. malariae* is very rare. Spleen indexes generally approximate parasite indexes. Further inquiries are being carried out at different seasons of the year. There are two malaria seasons, one at the beginning, the other at the end, of the rainy season, which extends from May to November. The rains in Cambodia transform the large central dry desert into a veritable lake. *N. W.*

DECOURT (Ph.). La lutte antiplasmodiale. Ses facteurs humains (deuxième mémoire). [**Human Factors of Anti-Plasmodial Measures.**]—*Bull. Soc. Path. Exot.* 1938. Feb. 9. Vol. 31. No. 2. pp. 138–147.

In the first part of this paper published in the January number of the *Bulletin de la Société de Pathologie Exotique* the author expatiated on the importance of movements of population in the dissemination of malaria; the dependence of the gravity of malaria on the resistance of the human organism, and on the fact that, other things being equal, the severity of endemic malaria varies inversely with the density of the population affected. To this latter point he returns. It explains why malaria is less severe in towns than in rural areas, even if the anopheline density be high. In rural areas, too, increased population,

with more intensive cultivation, tends to decrease anopheline prevalence. Reference is made to the influence of standard of living, and all that this implies, on the severity of endemic malaria. Several examples are quoted. Such discussions lead to a consideration of the manner in which fertile country, sterilized by malaria, can be repopulated and made productive without the disasters that accompanied such attempts in years gone by. In most malarious countries the wholesale bonification so successfully applied in parts of Italy is ruled out on the count of cost. For most countries outside Europe the total cost of measures necessary for reclaiming such territory must not exceed 200,000 francs for each 1,000 persons definitely installed, if such an undertaking is to be carried out by Government agency. Experience in very diverse conditions has shown this to be quite possible. In such reclamation work antianopheline and antiplasmodial measures must be combined. *N. W.*

Watson (R. B.), Kiker (C. C.) & Johnson (H. A.). **The Rôle of Airplane Dusting in the Control of Anopheles Breeding associated with Impounded Waters.**—*Public Health Rep.* 1938. Feb. 18. Vol. 53. No. 7. pp. 251–263. With 8 figs. (7 on 4 plates).

This is a description of airplane Paris-green dusting experiments carried out on a specially selected area of Lake Wheeler in the Tennessee Valley. The conclusion is reached that in suitable conditions airplane dusting is a practical and relatively economical larvicidal operation. Excellent results are obtained in rather open water with low emergent vegetation where other larvicidal measures are impractical. Where the water surface is covered with dense horizontally locking vegetation effectual control of Anopheles breeding is not obtainable. The cost of operating a dusting airplane is about $40 per hour. An airplane flying at 80 miles an hour can treat an area of 33 acres per minute. It is important to secure landing places at which the airplanes can be loaded as near the area to be treated as possible. Suitable time for dusting was limited to the early morning when there was least wind and air conditions were less bumpy. The usual height of flying was 25 feet ; one flight at 75 feet gave good results. It is, however, difficult to place the dust accurately at heights over 30 feet. At 25 feet the width of water effectively dusted may be 300 feet. *N. W.*

Pivovarov (V. M.) & Gutermann (E. M.). L'emploi de l'anabadust dans la lutte contre les moustiques hibernants. [**The Use of Anabadust for Elimination of Hibernating Mosquitoes.**]—*Med. Parasit. & Parasitic Dis.* Moscow. 1937. Vol. 6. No. 3. [In Russian pp. 424–432. French summary p. 432.]

Anabadust appears to be a preparation of *anabasine*, an alkaloid obtained from *Anabasis aphylla*, one of the chenopodiaceae, growing on the salt steppes of Trans-Volga and also in N. Africa, Armenia and elsewhere. It has been identified as 3-pyridyl–2-piperidine and as having a structure similar to neonicotine. It is a powerful insecticide of the nicotine type.

According to the authors it does not kill the insects at once, but paralyzes the motor centres and death occurs in 1–3 days in 98·4 per cent. of the insects. It affects only those mosquitoes with which the powder actually comes into contact, hence it is necessary to have good

dispersion. It is cheaper than sulphur and has the further advantage that there is no need of preliminary preparations of the dwelling in which it is to be used ; it does no harm to vegetation, food or clothes.

H. H. S.

Manohar (K. D.) & Khosrawy (K. K.). **Anginal Pain in a Case of Malaria.**—*Indian Med. Gaz.* 1938. Mar. Vol. 73. No. 3. pp. 151–153. With 3 figs.

This is a description of a case in which severe anginal pain, cyanosis, rapid pulse and low blood pressure marked the onset of an attack of malignant tertian malaria. The Wassermann reaction was positive during the acute attack ; there was no history or other evidence of syphilis. Complete recovery followed treatment with quinine. Reference is made to the literature of cases of malaria accompanied by anginal symptoms. *N. W.*

Comşa (Gh.) & Bruckner (I.). Deux cas de paludisme accompagné d'urticaire et douleurs abdominale aiguës. [**Two Cases of Malaria accompanied by Urticaria and Acute Abdominal Pain.**]—*Bull. et Mém. Soc. Méd. Hôpit. de Bucarest.* 1938. Jan. Vol. 20. No. 1. pp. 1–6.

Both the patients described in this paper were admitted to hospital suffering from fever, very acute abdominal pain, severe headache and a generalized urticarial rash. Blood examination in both revealed the presence of *Pl. vivax*. The condition of one patient was for a time very serious ; he was in a state of collapse. Both patients responded promptly to quinine and recovery was rapid and complete. The author refers to similar cases that have been recorded and discusses the manner in which malaria infection may give rise to such symptoms.

N. W.

Willoughby (H. M.). **A Case of " Choreiform " Malaria.**—*Jl. Roy. Nav. Med. Serv.* 1938. Jan. Vol. 24. No. 1. pp. 71–72.

A boy aged 18 was admitted to hospital with a temperature of 101·4°F. He was very restless ; there was incessant blinking of the eyelids and uncontrollable jerking of the arms. His head wagged from side to side as he talked and there was purposeless movement of the facial muscles. Heart was slightly enlarged to right of sternum ; there was a mid-diastolic murmur. There was no enlargement of the spleen. The condition simulated a severe case of chorea. The fever was intermittent ; the blood was examined and found to contain numerous ring-forms of *Pl. vivax*. Quinine was given and the choreiform symptoms ceased abruptly. *N. W.*

Melman (José). Um caso rebelde de impaludismo na criança. [**A Refractory Case of Malaria in Childhood.**]—*Hospital.* Rio de Janeiro. 1938. Mar. Vol. 13. No. 3. pp. 513–516. With 1 chart.

Description of a case of *falciparum* malaria in a child, four years of age, which failed to yield to prolonged treatment with quinine. A five-days' course of atebrin and plasmoquine resulted in cure and rapid

improvement in the child's general condition. The author enlarges on the advantages of atebrin in the treatment of malaria in childhood.

N. W.

Fleischmann (G.). Die nach Malaria vorkommenden Leberschädigungen. (Gibt es eine Leberzirrhose nach Malaria ?) [**Is there a Liver Cirrhosis after Malaria ?**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1938. Jan. Vol. 42. No. 1. pp. 13–21. [24 refs.]

In answering this question the author records the opinions of various authorities. He finds there is no unanimity of opinion. Comparatively few investigators recognize malaria as a cause and describe a cirrhosis of the liver after malaria. Malaria plays only a secondary part on a liver already damaged by other factors, *e.g.* alcohol, syphilis, and helminthic infections. So the present conception is that malaria has only a predisposing action in the production of cirrhosis of the liver.

E. D. W. Greig.

Raffaele (Giulio). Ricerche sul ciclo di evoluzione iniziale dei parassiti malarici umani. [**Initial Cycle of Development of Human Malaria Parasites.**]—*Riv. di Malariologia.* Sez. I. 1937. Vol. 16. No. 6. pp. 413–418. With 4 coloured figs. on 1 plate. [12 refs.] English summary (8 lines).

The author refers to previous work by himself, Huff and Bloom, James and Tate, and Kikuth on the reticulo-endothelial cycle of development of certain avian plasmodia. He has extended this work to human malaria. He has examined smears of bone-marrow obtained by puncture of the sternum of six individuals inoculated with the sporozoites of *P. vivax* and of two with *falciparum*. In two smears of bone-marrow obtained on the fifth day after inoculation with *vivax* sporozoites certain non-pigmented forms of parasite were observed similar to forms of avian plasmodia seen in the reticulo-endothelial system of birds. Two schizonts were seen, one free and the other included in a cell. In one reticulo-endothelial cell two young trophozoites were found. Such forms are very rare and the results recorded are the fruit of very protracted observation. *N. W.*

Verney (Lorenzo). Lo sviluppo dei parassiti malarici nel reticolo-endotelio. [**Development of the Malaria Parasite in the Reticulo-Endothelium.**]—*Ann. d'Igiene.* 1938. Jan. Vol. 48. No. 1. pp. 26–40. [12 refs.]

This paper contains no original observations. It is, however, an able and interesting summary of all the more important work that has been done during recent years in connexion with reticulo-endothelial cycle of development of the Plasmodia, and discusses the implications of these observations. *N. W.*

Pikoul (J. N.) & Osipova (N. P.). Essai du remplacement de l'antigène mélaninique dans la réaction de Henry par un indicateur chimique. [**Replacement of Melanin by a Chemical Indicator in Henry's Reaction.**]—*Med. Parasit. & Parasitic Dis.* Moscow. 1937. Vol. 6. No. 4. [In Japanese pp. 512–515. French summary p. 515.]

Melanin suspensions used in Henry's reaction are difficult to standardize and, in the authors' experience, give positive reactions

in non-malarious patients, pregnant women and sometimes in healthy individuals. Melanin can be replaced with advantage by a 0·05 per cent. solution of quinine chlorohydrate ; flocculation with this solution gave rise to a minimum of errors in diagnosis. The phenomenon of flocculation can be observed with numerous other indicators such as acriquine, antimony and carmine. Such observations indicate that Henry's reaction has little in common with an immunity reaction, but is, in all probability, connected with a disequilibrium in the proportion of the albumin and globulin fractions of the serum. Melanin should be looked upon as an indicator and not as an antigen. Too much reliance should not be placed on the reaction in diagnosis.

N. W.

Livierato (Spiro), Vagliano (Marino) & Kokaraki (Nearchos). Sur deux nouveaux antigènes pour la séroréaction du paludisme d'après la méthode de Henry. [**Two New Antigens in Henry's Reaction.**]—*C. R. Acad. Sci.* 1938. Mar. 28. Vol. 206. No. 13. pp. 1062–1063.

As an antigen in Henry's reaction melanin derived from eye pigment or ink-fish is not essential ; muscle fibre or blood fibrin serves equally well. These " antigens " are prepared as follows :— A portion of heart muscle, or mutton, or fibrin is ground up with six times its volume of distilled water and the mixture is sterilized. The suspension is then strained through gauze. One cc. of commercial formaline is added to each 200 cc. of the filtrate, which is then placed in a refrigerator. This liquid, centrifuged and diluted ten-fold, can replace the melanin of Henry's reaction.

N. W.

Cohen (A.) ; King (Harold) ; Ainley (A. D.). **Antiplasmodial Action and Chemical Constitution. Part I. Cinchona Alkaloidal Derivatives and Allied Substances** [Cohen & King].—*Proc. Roy. Soc.* Ser. B. 1938. Mar. 3. Vol. 125. No. 838. pp. 49–60. [16 refs.]. **Part II. Some Simple Synthetic Analogues of Quinine and Cinchonine** [Ainley & King].—*Ibid.* pp. 60–92. [19 refs.]

I. The common cinchona alkaloids may be represented by the general formula Q.CHOH.Qn.CH : CH_2 where Q represents the quinoline (or 6-methoxyquinoline) residue, Qn the bicyclic quinuclidine half of the molecule and .CH : CH_2 the vinyl side-chain, which in the reduced or dihydrobases becomes .CH_2.CH_3.

The authors have prepared and have tested in bird malaria certain modified cinchona alkaloids including chlorides (CHOH → CHCl), desoxy-bases (CHOH → CH_2), and the unsaturated bases, quinene, hydroquinene, and cinchene (.CHOH → .CH : C). These were all inactive, thus confirming, or adding to, previous observations indicating that interference with the central .CHOH. group is, in general, destructive of antiplasmodial action. When the vinyl side-chain is oxidized to a carboxyl group (.CH : CH_2 → COOH) it is well known that the resulting quitenine from quinine is inactive, but regains some activity on esterification. In this instance methyl esters of cinchotenine and cinchotenidine, the corresponding products from cinchonine and cinchonidine respectively, proved inactive, and this was also the case with quitenamide (.CH : CH_2 → COOH → $CO.NH_2$) and quitenmethylamide. Three synthetic compounds each having some structural analogy with the cinchona alkaloids also proved inactive.

II. Quinicine is a structural isomeride of quinine formed by the conversion of the .CHOH. group into the carbonyl group .CO. and the scission of the quinuclidine nucleus, with the formation of a piperidine ring (P) and belongs to the type represented by the general formula $Q.CO.CH_2.CH_2.P.CH:CH_2$. It is known to be inactive and it is now shown that the two stereoisomeric quinicinols formed by the reduction of the .CO. group to .CHOH. are inactive even when the further change $NH \rightarrow NCH_3$ is made in the piperidine ring. In these substances the quinoline and piperidine rings are separated by a 3-carbon chain, and to bring the type nearer to the cinchona alkaloids proper, bases represented by the general formula $Q.CHOH.C_5H_9NH$, in which Q is again a quinoline or 6-methoxyquinoline residue and C_5H_9NH a piperidyl group, were synthesized after considerable experimental difficulties. 4-Quinolyl-α-piperidylcarbinol, 4-(6-methoxyquinolyl)-α-piperidylcarbinol and a series of their *N*-alkyl derivatives ($C_5H_9NH \rightarrow C_5H_9NAlk$) were prepared and tested. The quinolyl compound was inactive but the two diastereoisomeric 4-(6-methoxyquinolyl)-α-piperidyl-carbinols were active, the more active form being that with melting point 162–163°, which has about the same M.T.D. as quinine and is about half as effective in terms of the therapeutic index. These are the first two active synthetic substances constructed on the cinchona alkaloid pattern to be prepared. The *N*-alkyl derivatives in both the quinolyl and 6-methoxyquinolyl series were inactive.

T. A. Henry.

Overbeek (J. G.) & Gilbert (A. P. W.). Vergelijkende proeven met atebrine en chinine per os gedurende een epidemie te Rantjapakoe in het regentschap Tasikmalaja van 14 Augustus T/M 17 September 1936. [**Comparison of Atebrin with Quinine by Mouth in a Malarial Outbreak.**]—*Meded. Dienst d. Volksgezondheid in Nederl.-Indië.* 1937. Vol. 26. No. 4. pp. 337–342. With 3 graphs. English summary.

Of 100 cases of benign tertian malaria, 53 were treated with atebrin, 0·3 gm. a day for five days, and 47 with quinine, 1·3 gm. a day for seven days. There was no significant difference between the rates of action of the two drugs on the parasite, but three weeks after treatment 34 per cent. of the quinine group harboured parasites as compared with 5·6 per cent. of the atebrin group.

In the case of one of the atebrin patients treatment was followed by acute mental disorder which lasted fourteen days. A month later he had a second attack of malaria: anxiety and mental confusion followed the administration of 0·3 gm. of atebrin. The treatment was continued for three days but fever and parasites persisted. The administration of 1 gm. of quinine reduced the temperature to normal and the patient became quieter. *N. W.*

Miyahara (Hatuo). **Studies in the Treatment of Malaria. XVII. On the Therapeutic Value of Atebrin.**—*Taiwan Igakkai Zasshi* (*Jl. Med. Assoc. Formosa*). 1938. Jan. Vol. 37. No. 1 (394). [In Japanese pp. 83–90. English summary p. 91.]

Experience gained in Formosa by treating 30 cases of malaria with atebrin, 0·30 gm. a day for five days, has led the author to consider atebrin no more effective than quinine in so far as the prevention of

relapses is concerned. The parasite relapse rate was determined by the frequent examination of the blood, thick film method, during eight weeks following the completion of treatment. The relapse rates are given by the author as follows: in 13 cases of *vivax* infection, 62 per cent; in 12 cases of *falciparum* infection, 23 per cent.; and in 5 cases of *malariae* infection, 7 per cent. *N. W.*

GARIN (Ch.). Réduction rapide de la splénomégalie palustre aiguë et chronique par le traitement mixte atebrine plasmoquine. Modifications humorales sous l'influence de ce traitement. [**Rapid Reduction of Acute and Chronic Malarial Splenomegaly by Treatment with Atebrin and Plasmoquine.**]—*Rev. Prat. Malad. des Pays Chauds.* 1937. July. Vol. 17. No. 7. pp. 301–4, 307. With 1 fig.

An account of two unusual cases of malaria. The first, a woman aged 26, was infected with *falciparum* malaria, for the first time, in Corsica in September. Two months later she was admitted to hospital with fever: the spleen reached below the umbilicus; there were schizonts of *falciparum* in the blood; her serum agglutinated *Br. melitensis* in a dilution 1/100—previously it had agglutinated in a dilution of 1/1,000. She received atebrin 0·30 gm. and plasmoquine 0·02 gm. on alternate days, on four occasions. At the end of this treatment the spleen had disappeared below the costal arch, the fever had disappeared, and the serum no longer agglutinated *Br. melitensis*.

The second case was of chronic malaria with a spleen similar in size to that of the first. Her blood harboured scanty *falciparum* parasites: her serum gave strongly positive B.W., Kahn and Meinicke reactions, though there was no history nor other signs of syphilis. She received two six-alternate-day courses of treatment with atebrin and plasmoquine in similar doses to those given to the first case. At the end of the second course of treatment the spleen had regained its normal size, the B.W. and the Meinicke reactions were negative, the presumptive Kahn test alone giving a slightly positive reaction. *N. W.*

GUPTA (S. C. Sen). **Quinine Tolerance in Pregnancy.**—*Indian Med. Gaz.* 1937. Dec. Vol. 72. No. 12. p. 740.

A severe attack of *falciparum* malaria in a woman seven months pregnant necessitated the intramuscular injection of ten grains of quinine three times a day on three successive days. Recovery was rapid and two months later she gave birth to a healthy child. *N. W.*

JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION. 1938. Apr. 23. Vol. 110. No. 17. p. 1388. **Quinine and Atabrine in Breast Milk.** [Queries & Minor Notes.]

The question of excretion of toxins in milk is of importance seeing that certain animal poisons—scorpion and snake venoms, for example—may be present in sufficient amount to produce fatal results in a breast-fed infant [J. A. WATERMAN, *Trans. Roy. Soc. Trop. Med. & Hyg.*, 1938, Vol. 31, pp. 607–624] and in countries where antimalaria drugs are habitually in use it is well to know if there are any risks to the child of a mother who is under treatment for malaria. The experiments of TERWILLIGER and HATCHER are referred to in this note: the

authors gave to two women by mouth five doses, each of 0·3 gm., of quinine sulphate and to four others seven doses of 0·64 gm. In all six traces of quinine could be found in the milk, in one as early as half an hour after administration. In none was it detected 24 hours after. In any case the amount present was too small to harm the nurseling.

No record could be found of the excretion of atebrin in the breast-milk, but it is of interest to note that in an article by Kwit and Hatcher, on the Excretion of Drugs in Milk (*Amer. Jl. Dis. Children*, 1935, Vol. 49, p. 900) tests were made as regards morphine, codeine, salicylic acid, phenolphthalein, barbital, sodium and potassium bromides. Of all these sodium bromide was the only drug found in amount sufficient to injure a normal breast-fed infant. *H. H. S.*

Farinaud (E.), Baccialone (L.), Lataste (C.) & Nguyen-Van-Lien. Recherches préliminaires sur l'élimination de la quinacrine chez le malade paludéen. [**Preliminary Inquiry concerning the Elimination of Quinacrine in Malaria Patients.**]—*Bull. Soc. Path. Exot.* 1937. Nov. 10. Vol. 30. No. 9. pp. 791–799. With 3 figs.

The observations recorded concern the day-to-day elimination of quinacrine in the urine of three patients. The first was a chronic malaria sufferer who had been admitted to hospital for an appendicectomy; the second was an acute case of malaria with threatening pernicious symptoms; the third was a patient suffering from mental confusion as the result of too prolonged administration of quinacrine. The method employed was to transform the quinacrine salt present in the urine by the addition of potassium or sodium carbonate to saturation and then extract it with chloroform. The chloroform extract was compared with standard dilutions of the drug by means of a fluoroscope. The total urine passed in the 24 hours was used for these examinations.

After a five-day treatment with quinacrine the drug only appears in the urine in appreciable quantity after the lapse of a certain time, four days in the first case. Thereafter, for four or five days, very considerable quantities are excreted. Then the amounts excreted become progressively less and less for about a month. This is followed by a varying period of residual elimination. A period of about 70 days is commonly required for the total elimination of quinacrine. A repetition of the treatment provokes an increase in the elimination of quinacrine in the urine, both in quantity and duration. The "latent period" is shorter. It would seem that the organism is saturated with the drug for a considerable time after the first treatment. The total amount of quinacrine found in the urine is but a small proportion of the total dose administered. *N. W.*

VENOMS AND ANTIVENENES.

Schöttler (W. H. A.). Die Gifte von *Vipera latasti* und *V. lebetina*. [**The Venoms of** *Vipera latasti* **and** *V. lebetina*.]—*Ztschr. f. Hyg. u Infektionskr.* 1938. Mar. 19. Vol. 120. No. 4. pp. 408–434. With 4 figs. [49 refs.]

This is a long and detailed account of the poisons of two species of viper and experiments carried out with them. The results of these experiments are set out in a series of 20 protocols, which cannot satisfactorily be abstracted, though the conclusions can be presented :—

1. *V. latasti* emits the equivalent of 15 mgm. of dried venom on an average when biting, *V. lebetina* twice this amount.
2. The minimum lethal dose (M.L.D.) of the former is smaller than that of the latter, being 0·02 mgm. and 0·03 mgm. respectively for a 10 gm. mouse.
3. The certain lethal dose (C.L.D.) is the same for both, namely 0·06 mgm.
4. The active principle in each case is a powerful haemorrhagin. The anticoagulant action is much reduced by heating to 75°C. and destroyed altogether at 100°C. [the length of exposure to these temperatures necessary to produce these effects is not stated].
5. Both contain a very weak haemolysin, the former rather more than the latter.
6. *V. latasti* venom contains a strong thermoresistant neurotoxin which is absent from *V. lebetina*.
7. *V. latasti* venom produces a rapid fall in erythrocytes with leucocytosis, and both venoms cause neutrophilic increase, more in the case of the former, persisting for 3 days ; with *lebetina* the increase is less and falls markedly again to considerably below the number before injection after 10 hours.
8. For treatment of a bite by *V. latasti* one ampoule of 10 cc. of anti-*ammodytes* serum (Milan), or the Paris antivenene, ER, or the Vienna European snake antivenene suffices, for that by *V. lebetina* at least two ampoules of the first are needed. *H. H. S.*

Chin (Keisho). Ueber den Einfluss gewisser Schlangengifte auf den Ca- und K-Gehalt des Kaninchenserums, sowie dessen Beziehungen zu den Tonusanomalien des vegetativen Nervensystems. I. Studien ueber die Gifte formosanischer Crotalinae. [**The Effect of Certain Formosan Snake Venoms on the Calcium and Potassium Content of Rabbit-Serum. I. Crotalines. II. Elapines.**]—*Taiwan Igakkai Zasshi* (*Jl. Med. Assoc. Formosa*). 1938. Jan. Vol. 37. No. 1 (394). [In Japanese pp. 106–121. With 9 charts. [42 refs.] German summary pp. 122–123.] II. Studien ueber die Gifte formosanischer Elapinae.—*Ibid.* [In Japanese pp. 124–131. With 6 charts. German summary pp. 131–132.]

I. Injection of the venoms of *C. mucrosquamatus*, *C. gramineus* and *Ancistrodon* in doses of 0·01 mgm. per kilo. body weight of rabbits produced no change in the serum content of calcium or potassium. With doses of 0·1 mgm. or over the K/Ca quotient is increased in each case.

II. *Naja naja atra* venom in doses of 0·002 mgm. per kilo. causes no change in the Ca or K content ; with 0·02 mgm. a slight lowering, more marked with 0·2 mgm. The K/Ca quotient is unaltered with doses below 0·2 mgm., above that it is slightly reduced.

Bungarus multicinctus venom, in doses of 0·0002 mgm. per kilo., produces slight fall, but with 0·002 mgm. the K content falls, the Ca falls later, after a preliminary rise and the K/Ca quotient presents a similar primary reduction and secondary rise. *H. H. S.*

Chopra (R. N.) & Chowhan (J. S.). **Cobra Venom in Therapeutics.**—*Indian Med. Gaz.* 1937. June. Vol. 72. No. 6. pp. 339–348. [34 refs.]

This article not only summarizes well the general results of the large amount of work already done on the therapeutic uses of Indian snake venoms, but gives details of over a score of cases illustrative of several groups. In introductory paragraphs the authors give a brief résumé of the action of cobra venom (*a*) on the tissues, (*b*) on the cardio-vascular system, (*c*) on the nervous system. Next follows an epitomization of the literature dealing with the use of the venom in inflammatory conditions of the eye, in neoplasms, and in cutaneous affections and leprosy. The venom employed in the authors' cases was prepared from the dried cobra venom which was dissolved in sterile physiological saline in a concentration of 1 in 10,000, passed through a Seitz filter and put up in 0·5 cc. ampoules. The standard was one "mouse unit," *i.e.*, the maximum dose which did not prove fatal to a 20 gm. white mouse in 24 hours or less, when injected intramuscularly; this was ten times as large as that tolerated when injected into the dorsal tail vein. In the cases related the initial dose was 0·5 to 1·0 m.u. (mouse unit) injected twice weekly rising gradually, according to the reaction produced, to 10 m.u., occasionally more.

The subjects treated during the past two years at the Calcutta School of Tropical Medicine and in the Carmichael Hospital are over a hundred and from these a selection has been made for record. These are divided into five groups: i. With vague symptoms associated with pain in various parts of the body (9); ii. Those suffering from the nerve type of leprosy (6); iii. Those with new growths (carcinoma of tongue or throat) (3); iv. Three patients sensitive to the venom; v. Two with pain and paraplegia. The results were relief of pain, improvement in general health and in appetite. Relief of tabes-like symptoms was marked and those with neuralgias or neuritis.

The authors agree with Macht that the action is on the sensory nerve-endings, like that of opium and its alkaloids, but is of much longer duration. The analgesic properties are in the neurotoxic constituent of the venom. The haemolysins, haemorrhagins and other principles also have their effects on injection; as the authors say in conclusion: "The separation of these active principles and a study of their pharmacological action . . . may give us therapeutic remedies of importance" [see also Peck, S. M., Rosenthal, N. & Erf, L.; v. Klobusitzky, D., this *Bulletin*, 1937, Vol. 34, pp. 645, 663].

H. H. S.

Rottmann (Alexander). Zur Therapie der sensiblen Reizsymptome bei Tabes dorsalis durch Kobratoxin. [**Cobra Venom in the Treatment of Tabetic Crises.**]—*Klin. Woch.* 1937. July 24. Vol. 16. No. 30. pp. 1051–1056. With 1 chart. [16 refs.]

The author, after reviewing the therapeutic uses of cobra venom, gives short notes of ten cases of tabes from the Vienna University

Clinic treated by this means for relief of crises. The preparation employed was a venom [species not stated] of which ampoules of 5 cc. contained 200 mouse-units. He gave doses, in most cases daily at the beginning, increasing from 10 units to 25 or 30, then at longer intervals, 7–10 days, larger doses up to 60 units. He obtained, as others have reported also, good results, and thinks it acts on the specific granulation process. He warns against interpreting coincident freedom from pain as consequent relief of pain, and does not think the venom serviceable in conditions such as meralgia paraesthetica, amputation neuralgia, and herpes zoster. *H. H. S.*

Koressios (N. T.). L'action du venin de cobra total (non-filtré) sur la température et l'état général des tuberculeux. [**Results of Injection of Cobra Venom on Tuberculous Patients.**]—*Bruxelles-Méd.* 1937. June 27. Vol. 17. No. 35. pp. 1278–1284. With 8 charts.

[Workers with snake venoms seem of late to have been engaged in obeying the injunction of trying all things; it is to be hoped that they will review their results critically to decide that which is good before they comply with the second part of the injunction. The venom has been reported as beneficial in haemorrhage, in haemophilia, in epilepsy, in cancer, in neuralgias, in rheumatism, in tabes, and now the claim is made that it is good in tuberculosis.] The preparation used by the author was Cobranyl " Meurice," a solution of whole, unfiltered venom injected in doses of 0·05 mgm. at intervals of 3 to 7 days. To interpret the results three essentials are laid down: (1) That the temperature curve should have been fairly constant for several days preceding the first injection; (2) That the fall of temperature should follow at once after the injection; (3) That the same principles should apply as regards weight—a preceding decrease and subsequent rise.

Fifteen cases have been treated with the venom, the patients suffering from tuberculosis in different forms: chronic pulmonary, pleural, peritoneal and intestinal. Notes are given of eight of them, in whom the injections were succeeded by a fall in temperature of 1° to 2°C. (though it remained intermittent), transient in three, more lasting in five. The other seven retained their irregular oscillations. All those in an early stage of disease put on weight and showed improvement in their general state. The author suggests that the mode of action of the venom is primarily by furthering elimination of toxins accumulating in the tissues and secondarily by capillary vasodilatation induced by action on the metasympathetic. The number of cases and still smaller number which benefited are too few for drawing valid induction. *H. H. S.*

Kujawski (E.). O veneno da cobra nos adenomas prostaticos. [**Cobra Venom in Cases of Prostatic Adenoma.**]—*Acta Med.* Rio de Janeiro. 1938. Feb. Vol. 1. No. 2. p. 175. [In Spanish & English.]

Records of benefit following the use of snake venom in malignant growths led the author to test the same remedy on benign tumours and for a first trial he employed it in four patients with adenoma of the prostate. Fuller details are promised for subsequent publication;

this is merely a preliminary note and one case only is mentioned—a man of 68 years with severe urinary obstruction and a residuum of 600 cc. Nine injections were given [dosage and frequency will probably be stated in the fuller account] and the improvement is said to have been such that the second stage of the operation was not deemed necessary. In all four patients the dysuria, incontinence and nocturnal micturition disappeared. *H. H. S.*

GRASSET (E.) & ZOUTENDYK (A.). **Studies on the Gaboon Viper** (*Bitis gabonica*) **and the Preparation of a Specific Therapeutic Antivenene.** —*Trans. Roy. Soc. Trop. Med. & Hyg.* 1938. Jan. 25. Vol. 31. No. 4. pp. 445–450. With 8 figs.

The authors have shown that polyvalent antivenene prepared from the venoms of the puff adder (*Bitis arietans*) and the Cape cobra (*Naia flava*) are practically ineffectual against the venom of the Gaboon viper (*Bitis gabonica*), a common snake in equatorial Africa [see this *Bulletin*, 1936, Vol. 33, p. 383]. As there is no available antivenene, workers have been a little shy in experimenting with it and the authors were able to obtain only a limited supply. The average yield of a snake is 200 mgm. when the product is dried, but as much as 484 mgm. has been obtained. The venom is less toxic than that of the puff adder as the following table demonstrates.

Toxicity of the venom of Bitis gabonica *compared with* Bitis arietans *venom.*

	Route	Venom in mg.	
		Bitis gabonica	*Bitis arietans*
Mouse	Subcutaneous	0·4	0·15
Rat	,,	3	1·5
Guineapig (500 grammes)	,,	75	50
Rabbit (1,500 grammes)	Intravenous	3·2	1
Pigeon	,,	0·075	0·075*
	Subcutaneous	2·5	2
Fowl	Intravenous	0·6	1·5
Sheep	Subcutaneous	80	50

* *Note.*—In a paper dealing with the toxic and antigenic properties of snake venoms (GRASSET, ZOUTENDYK and SCHAAFSMA, 1935), the fatal dose of *Bitis arietans* venom for the pigeon appeared as 0·75 mg.; this should read 0·075 mg. as in the present table.

Atoxic derivates analogous to those previously obtained from *Bitis arietans* were prepared by subjecting 1 per cent. solutions of the venom in Martin's broth to 0·75 per cent. formalin at 37°C. for three weeks. With this a horse is injected subcutaneously at weekly intervals with doses increasing from 50 mgm. to 700 mgm. [More would have been given but the supply was exhausted.] The serum was tested during the process on rabbits and after the fifth injection (400 mgm.) death was delayed to 16 hours in rabbits injected with 7·5 mgm. venom and 3 cc. serum; after the seventh injection (600 mgm.) the use of serum was followed by survival of the animals which presented no ill-effects. Test of the serum ten days after the last injection

showed that 3 cc. would neutralize 10 mgm., that is 1 cc. would neutralize approximately 1 m.l.d. for a rabbit of 2,000 gm.

Concentration by fractional precipitation with sodium sulphate produced a strength of pseudoglobulin of which 0·45 cc. would neutralize 5 mgm. venom, that is the concentrated serum was 3·3 times as potent as the original product. One cc. of this finished product diluted with distilled water for use neutralizes 7 mgm. of the venom, and 20 cc. (=140 mgm. venom) is the dose recommended. For travellers in equatorial Africa this should be carried either as a monovalent serum or incorporated in the generally used polyvalent preparation [see this *Bulletin*, 1937, Vol. 34, p. 722]. *H. H. S.*

Valle (Sergio). O anaveneno crotalico em ophtalmologia. [**Snake Venom in Ophthalmology.**]—*Rev. Brasileira Leprologia.* S. Paulo. 1937. Dec. Vol. 5. No. 4. pp. 481–500. With 1 fig. [14 refs.] English summary [10 lines.]

The author touches upon the uses of snake venom for treatment of painful conditions such as neuralgias of leprosy, cancer, and tabetic crises and goes on to record benefit from conjunctival and retrobulbar instillation (0·5 cc. of Crotalus anavenene with 1·5 cc. physiological saline), the number of drops depending on the intensity of the pain. It acts on the ciliary nerves and on the peripheral endings of them "blocking all ocular sensitivity." He finds it valuable in ocular pain whether of leprotic or other origin, giving immediate and lasting relief without causing any disturbance, local or general. *H. H. S.*

Löwenstein (Wilfried). Die Verwendung von Schlangengift und ähnlich wirkenden Pflanzengiften in der Therapie. [**Employment of Snake Venoms and Plant-Poisons with Similar Action.**]—*Wien. Klin. Woch.* 1938. Mar. 11. Vol. 51. No. 10. pp. 302–306.

Sajidiman. Mededeelingen over slangenbeten. [**Snake Bite.**]—*Med. Berichten.* Semarang. 1937. Jan. & Mar. Vol. 1. Nos. 4 & 5. pp. 50–54; 69–73.

The author draws attention to the few records of cases of snake bite in Java. In the present communication the history of a case of bite in the heel by *Bungarus fasciatus* is given fully day by day. The chief features of the case were the occurrence of haemorrhage in all parts of the body and its appearance in urine and faeces, delay in coagulation time, prolongation of bleeding time, severe thrombocytopenia, increased sedimentation rate and great tendency to oedema. Treatment of snake bite is in the first place a serum treatment, and intravenously if the symptoms are serious. The patient in question showed continuous bleeding, not only from the bite but also from injection sites. Consequently vitamin C in the form of Redoxon was injected, on the grounds that it possesses styptic properties, promotes an increase in thrombocytes and probably also of the serum albumin. The rapid increase of thrombocytes was striking. When the patient had recovered, except for persistence of an infiltration of the left calf and some local pain, he could not be kept in hospital any longer.

W. F. Harvey.

Biggi (Pietro). Un caso di grave avvelenamento da vipera curato, a cinque ore di distanza, con iniezione endovenosa di siero anti-vipera. [**Viper-bite treated with Antivenene Intravenously.**]—*Terapia.* Milan. 1937. Apr. Vol. 27. No. 214. pp. 108–110.

A woman of 30 years was bitten on the right foot by a viper [not specified]. She was not seen by the author till five hours later when she was collapsed, delirious, with severe headache, nausea and obstinate vomiting, marked dyspnoea, small rapid pulse. In view of the grave condition she was given the contents of a phial [quantity not stated] of anti-viper serum I.S.M. The results were dramatic : in ten minutes she was calmer and recognized those around her and in a quarter of an hour the pulse was normal and dyspnoea subsided. Though she was much better a second injection was given the following day and convalescence was uninterrupted. *H. H. S.*

Banić (M.) & Ljubetić (T.). Die Titration eines Serums gegen Schlangengift an Mäusen (Serum antivipera ammodytes). [**Titration of** *V. ammodytes* **Antivenene in Mice.**]—*Ztschr. f. Hyg. u. Infektionskr.* 1938. Mar. 19. Vol. 120. No. 4. pp. 390–407. With 1 fig. [12 refs.]

MEDICAL AND SANITARY REPORTS.

NYASALAND PROTECTORATE (1936).

Nyasaland Protectorate consists of a strip of land about 520 miles long by 50 to 100 miles broad lying to the west and south of Lake Nyasa. Its neighbours are Northern Rhodesia to the west, Tanganyika to the north and north-east and Portuguese East Africa to the south. Its total area is approximately 37,596 sq. miles of land and 10,353 sq. miles of water, and its chief towns are Blantyre, Limbe, and Zomba (the headquarters of the Government).

Vital Statistics.—Under this heading Dr. A. D. J. BEDWARD WILLIAMS, Director of Medical Services, observes, "It is difficult if not impossible to assess the effectiveness of the work of the Medical Department in regard to the general health of the population except by reference to its vital statistics." Records of births and deaths have been maintained in the Fort Manning District since May 1933 and excellent work has been accomplished. In 1935 similar efforts were applied to the Karonga District but unfortunately the work had to be curtailed owing to shortage of medical staff. Another important medico-statistical enterprise implemented in Nyasaland takes the form of *Medical Surveys* and a considerable mass of most valuable information has been assembled as a result of these commendable enquiries. (These matters were mentioned in this *Bulletin*, 1936, Supp., pp. 58*–59*, and 1937, Supp., pp. 63*–64*). Extracts are given from Medical Officers' Reports concerning the results of three Surveys and in one case, relating to the Survey of the West Nyasa District, a particularly interesting and full account is contributed by Dr. D. P. TURNER, Medical Officer of the area. Of the Medical Surveys, Dr. BEDWARD WILLIAMS says, "Medical surveys it is true give a clear indication of the extent of invalidity . . . but the scope of medical surveys is necessarily small, and affects only a minute proportion of the population in any one year." These accounts should be read in their entirety since limits of space prohibit anything more than brief mention of these really admirable enterprises in these pages.

The available facts relating to Nyasaland as a whole read as follows :–

Race.	Population	Births	Deaths
Europeans and Whites	1,838	35	18
Africans	1, 619,530	Not known	Not known
Asiatics	1,558	71	18

The following data relate to the Fort Manning District (see above) :

Population (approximate) ...	35,000
Births	7,982
Birth rate	46·8 per 1,000 population
Deaths	3,439
Death rate	21·8 per 1,000 population
Infant Mortality Rate ...	82·3 per 1,000 live births.

European Officials resident numbered 269 with an average number resident of 206. Four were invalided and one died. *Native Officials* (including Native Troops and Police) numbered 2,603 ; nine died during the year.

Maternity and Child Welfare Work.—Progress was seriously hampered chiefly owing to financial stringency. Only 104 confinement cases were dealt with at Government Hospitals, and of the total only 26 were normal labours. As no women Medical Officers are employed by Government and no European nurses at any Government African Hospital with the sole exception of Zomba, it is difficult to persuade pregnant native women to attend treatment centres to provide necessary treatment for the babies or young children, or even to make provision for the training of native girls and women as midwives and welfare workers. The maternity and infant welfare centres established in 1935 in the African Hospital, Zomba (see this *Bulletin*, 1937, Supp., p. 62*) and at the Jeanes School, are the only Government places where an active interest is taken in the welfare of women and children. With aid from the Colonial Development Fund three welfare clinics and three houses for health-sisters were erected, but lack of financial assistance from Government funds made it impossible to make full use of the buildings. Facilities for training and increases in the European nursing and health staffs are urgently needed.

Dr. Turner supplies a series of facts relating to mothers and infants in the West Nyasa District (see Medical Surveys above). His records show for 472 mothers 1,952 births or an average per woman of 4·6: of the total children born 997 were living at the time of the survey. Miscarriages are said to be very common and the taking of abortifacients a usual practice.

Medical Missions continued to carry out useful work at the three maternity and infant clinics subsidized by Government; at these centres some training of native midwives is undertaken. The Blantyre Mission Hospital is to receive a Government grant-in-aid to further the training of midwives.

The record of the year's work at various centres may be set out in the following manner :—

Centre	Maternity Cases	Maternal Deaths	Infants on Registers	Infant Deaths
African Hospital, Zomba	11	2	219	—
Mlanda Mission ...	63	1	417	42
Blantyre ,, ...	159	11	240	210
Bandawe ,, ...	23	—	65	—
Jeanes' School ...	13	—	—	—

School Hygiene.—Owing to unusually high incidence of sickness among the qualified medical personnel, the programme of work had to be curtailed. The three European schools were inspected and 27 boys and 40 girls examined; improvement in the dental condition of the Blantyre and Limbe pupils was recorded; in Zomba 90 per cent. of the children showed enlarged or unhealthy tonsils. The pupils attending three other schools were examined, results being set out in some detail; these included :—

(*a*) *The Providence Girls' School, Mlanje,* where 83 pupils were examined; data are presented relating to ages, heights, weights, blood films positive for malaria parasites, with percentages for each type of infection, stools positive for hookworm, urines positive for *S. haematobium*, palpable spleens, etc.

(*b*) *Kota-Kota School*, where 111 girls were examined ; results are given of blood examinations for the presence of malaria parasites, stools, and urines, and spleen examinations.

(*c*) *The Catholic Institute, Blantyre*, 58 pupils examined ; conditions described as regards nutrition, skin diseases, teeth, tonsils, blood and urine examinations.

In his Report of the Survey of the West Nyasa District, Dr. Turner (see *Medical Surveys* above) tabulates the results of his examinations of 707 children ranging from 0–10 years of age ; various abnormalities are recorded in absolute numbers and in percentages.

Public Health, Sanitation, etc.—Fortunately, no serious epidemic outbreaks menaced the health of the people during 1936, during which year considerable departmental reorganization was in progress. In the Districts, while curative medicine was well maintained, emphasis was laid upon the importance of preventive health measures ; medical officers were encouraged to visit rural dispensaries frequently and to devote as much time as possible to the training of their native assistants.

Despite a continued paucity of funds a marked improvement in the sanitary condition of certain villages is reported. This is especially true of the Fort Manning District where many villages have been reconstructed, water-supplies improved, and where itinerant inspectors maintain registers of births and deaths. The aim of the Medical Department is to develop " health units " centred on rural dispensaries as funds and staffs allow from time to time. As evidencing the progress made in *general sanitation* in the face of stupendous difficulties, the following extracts from various sections of the Report and relating to different areas, may be cited :—

" 35 villages have been partially or completely reconstructed and sanitated."

" the completion of 470 latrines in one part of the district and of 40 in another."

" latrinization of the district is proceeding steadily."

" it is now the usual thing to find every hut with its own latrine."

Water supplies are scarcely mentioned (see this *Bulletin*, 1937, Supp., p. 65*). Of one area it is said " the only source of water supply is from holes dug by the natives alongside swamps." Endeavours are being made to improve these conditions.

Labour conditions received considered attention. With the permission of employers of labour, medical officers visited estates and proffered advice with regard to general sanitation, housing, etc. ; their suggestions were welcomed by the majority of estate owners. The conditions observed on four estates employing an aggregate of about 4,500 labourers are tabulated as regards housing, latrine accommodation, water supplies, food, medical facilities. During the year 1,579 natives were medically examined for mining work in South Africa or in Southern Rhodesia. The number of emigrants proceeding independently in search of work to other territories is not known, but in 1935 it was estimated that about 120,000 Nyasaland natives were abroad (see this *Bulletin*, 1937, Supp., p. 65*). A number of repatriated Nyasaland natives return each year ; during the year under review 1,472 returned from South Africa and a number from Southern Rhodesia ; all are medically examined on arrival in the territory.

Housing and Town Planning matters in the Protectorate are dealt with by a Central Town Planning Committee. In Zomba, Blantyre, and Limbe, progress is reported in the establishment of model villages for the accommodation of natives. As regards *food in relation to health and disease*, the adequacy or otherwise of native diets, native methods of agriculture, etc., are among matters under investigation. Interesting facts relating to native diets have been assembled by medical officers during the course of their Medical Surveys. Dr. H. G. FITZMAURICE contributes a particularly interesting and detailed account of native foodstuffs and diets in the Kota-Kota District.

Reports by district medical officers and sub-assistant surgeons describe *measures taken to spread the knowledge of hygiene and sanitation*; these follow along lines previously described (see this *Bulletin*, 1937, Supp., p. 65*).

Recommendations.—Dr. Bedward Williams observes that since no great increase of funds or staff is likely to be forthcoming in the immediate future, the problem facing the authorities is to devise an organization capable of effecting the greatest amount of good with the limited budgetary allowances available. In these circumstances, the training of African personnel is of first-rate importance, for native assistants better educated, trained to diagnose and treat minor ailments, and capable of taking charge of general hygiene and sanitation work in rural areas, are urgently needed; steps have already been taken to this end but the scheme of training demands for its efficient implementation additional European instructors. The extension of maternity and child welfare work is especially emphasized, and for the training of native midwives the appointment of a qualified female medical practitioner is considered necessary. Other requirements envisage the erection of a new European Hospital, an up-to-date and well equipped laboratory, and the appointment of a qualified European laboratory assistant.

The scheme of *training African Personnel* provides for the training of native female nurses, native male dispensers and dressers, laboratory assistants, etc. Candidates are required to have reached a prescribed educational standard before they are admitted to take the courses extending over fifteen months. At the Jeanes' School Centre a number of welfare and community workers have commenced a two years course of instruction along lines suggested by the Medical Department.

[*Special Note.*—The Medical Surveys frequently mentioned in these notes are a characteristic feature of public health work in Nyasaland and as such are worthy of special consideration. Results achieved by Medical Officers conducting these small-scale enquiries are excellent in every way, and since it is quite impossible in these pages to do ample justice to reports of work accomplished in the course of these investigations, readers are recommended to turn to the descriptions supplied and read them in their entirety (see also this *Bulletin*, 1937, Supp., pp. 63*–64*.)]

Port Health Work.—A quarantine camp is established at Port Herald [on the Lower Shire River, on the main railway line, Beira to Blantyre, and about 113 miles from Blantyre]. At this centre Asiatics and natives entering Nyasaland and who may have been in contact with infectious diseases, or unable to produce vaccination certificates, are dealt with. During the year 45 natives only were examined at this station.

Hospitals, Dispensaries, etc.—Except that from time to time small additions, improvements, etc., have been made to the European Hospitals there is nothing of moment to report (see this *Bulletin*, 1936, Supp., p. 61*, and 1937, Supp., p. 66*). At these institutions 165 persons received treatment as in-patients and 1,685 as out-patients ; 3 hospital deaths were recorded. *Malaria, dysentery, diseases of the digestive system,* continue to be among the principal ailments treated.

As regards the *Native Hospitals* the most noteworthy feature is the increase in female patients. This is particularly noticeable in the Zomba area where there are two European sisters and where the female wards are staffed with African females ; the returns show a 31 per cent. increase of female patients over the 1935 records. *In-patients* treated at all native hospitals numbered 9,757 with 250 deaths, hospital out-patients numbered 133,751, and cases treated at the 93 *Rural Dispensaries* 301,738. *Diseases of the skin, digestive system, respiratory affections, malaria, venereal diseases* and *helminthic diseases* were among the principal causes of ill-health recorded.

The usual grants-in-aid were made to Mission Hospitals for the treatment of natives sent to them by Government.

From the references to general morbidity experience in the text of the Report the following summaries have been compiled :—

Malaria cases reported from hospitals and rural dispensaries are stated to have totalled 16,002, distributed as to 177 Europeans and 15,825 Asiatics and Africans. Actual hospital returns however give the following details :—

Type of Infection.	Europeans		Asiatic and Africans		Rural Dispensary
	In-patients	Out-patients	In-patients	Out-patients	Out-patients
Benign tertian	3	12	32	301	—
Quartan ...	0	7	29	135	—
Subtertian ...	7	32	356	903	—
Cachexia ...	1	3	26	63	—
Undefined ...	12	123	353	4,650	10,773
Totals ...	23	177	796	6,052	10,773

By this showing it would appear that 17,821 malaria patients were treated. Eleven deaths among Asiatics and Africans were ascribed to the disease. Of *blackwater fever* 14 cases with 3 deaths were recorded.

The chief vectors of malaria in Nyasaland are *A. gambiae* and *A. funestus*. The disease is hyperendemic over the whole territory, with seasonal variations. In rural areas the efforts of the Medical Department have but little effect in reducing incidence, but in the townships, where anti-malarial works are effectively carried out, a fairly satisfactory state of affairs is said to exist (see also this *Bulletin*, 1937, Supp., p. 67*).

At the Government Laboratory, Zomba, out of the 3,229 blood films examined 1,098 were positive for malaria parasites with the following findings—*P. falciparum* 796, *P. malariae* 230, *P. vivax* 39, mixed infections 29, and undefined 4.

The epidemic of *smallpox* which has raged with diminishing force during the past seven years has almost completely died out—183 non-fatal cases only were reported. Vaccinations performed during the year totalled 236,085. Eleven cases of *cerebrospinal fever* were treated in native hospitals with 4 deaths. It is stated that an unknown number of cases also occurred in the districts where spasmodic outbreaks are reported from time to time, but the infection does not appear to spread.

Hospital Returns show 2,545 cases of *influenza* with one death, 538 of *relapsing fever* with one death, 2 of *acute poliomyelitis*, and one European case of *typhus*. *Rabies*, of which 6 cases were recorded, continued to be a source of unrest throughout the Protectorate. Numbers of persons who had been exposed to infection took advantage of anti-rabic treatment.

Measles is said to be widespread throughout the territory. During the year 1,191 cases of measles and German measles were reported.

Enteric fever.—The Report observes, " Six cases occurred amongst Europeans and one case was reported amongst the native population." On turning to the Hospital Returns the reader finds 3 European in-patients, 3 European out-patients, 6 African in-patients and one out-patient. Laboratory findings showed 4 positive agglutinations (out of 99 tests made), 3 with *Bact. typhosum*, 1 *Bact. paratyphosum A*. As regards *dysentery* the Report states " The total number of cases reported was 1,429," but Hospital Returns show that 1,708 in- and out-patients were treated ; of the total 363 were amoebic, 71 bacillary, and in 1,174 cases the type of infection was not defined. Out of over 6,000 stools of Africans examined for intestinal parasites, 3·7 per cent. were positive for *E. histolytica*.

Of *tuberculosis* it is said 246 cases of all forms of the disease were reported. In-patients and out-patients treated at Government institutions total 410 and of these 205 were suffering from the *pulmonary* form of the disease. In the opinion of most medical officers the incidence of the disease is increasing. It is noted that during the period 1932–36 among the 611 repatriated Nyasaland natives from Southern Rhodesia, 64, or 10·4 per cent., were suffering from tuberculosis. The spread of the disease may be influenced by this factor of repatriated labourers, for it is not known how many such natives return each year from neighbouring territories and from South Africa. The control of the disease in these circumstances is difficult ; efforts are being directed towards localizing all infected persons.

Six cases of *trypanosomiasis* were reported. The Medical Entomologist, Dr. W. A. Lamborn, carried out examinations of the excreta of *G. morsitans*, with a view to the further study of the flagellates sometimes passed by the fly. Flies known to be infected were also fed to certain animals and the blood of the latter examined from time to time. No positive results attended these experiments.

Helminthiasis.—A year ago the findings of the *Medical Surveys* were referred to in these pages (see this *Bulletin*, 1937, Supp., pp. 63*–64*) and the percentages of persons infected with hookworm and schistosomiasis, etc., recorded. It is said that in the Mlanje area 22·7 per cent. of all cases of illness treated in the native hospital were due to infection by either hookworm or bilharzia. The following details extracted from the Report under review, indicate the incidence of these infections :—

Institution	No. Examined	Percentage infected with—		
		Hookworm	S. mansoni	S. haematobium
Providence Girls' School, Mlanje	304	11·0	0·6	28·0
Boys' School, Karonga	260	25·3	19·0	55·0
Girls' School, Kota-Kota	111	46·0	16·2	77·5
Catholic Institute, Blantyre	58	72·0	?	46·0
Central Prison, Zomba	300	37·0	?	12·7

Hospital Returns show that in- and out-patients treated for *ankylostomiasis* totalled 12,763, for *schistosomiasis* 7,122, for *ascariasis* 833, and for *taeniasis* 34. (Little meat is eaten, but when available is well-cooked.) Of the total cases recorded only 4 occurred among Europeans. At the Laboratory where over 6,000 stool specimens of Africans were examined, 31·6 per cent. were positive for hookworm, 2·3 per cent. *S. mansoni*, 0·1 per cent. *S. haematobium*, 2·7 per cent. *ascaris*. Other faecal specimens to the number of 1,482 were examined and among the 586 positive findings 70·8 per cent. were hookworm, 4·3 per cent. *S. mansoni*, 0·2 per cent. *S. haematobium*, and 3·9 per cent. *ascaris*.

Venereal Diseases.—Clinics are established at Blantyre and at Zomba, but difficulty is experienced in persuading patients to attend for treatment to cure. During the year 4,244 cases were treated at hospitals and dispensaries, only eleven of these at European hospitals. The distribution of cases was *syphilis* 3,134, *gonorrhoea* and its complications 1,101, and *soft chancre* 9. Many women in rural areas are said to suffer from venereal diseases but in the absence of native nurses or lady medical officers they are reluctant to seek treatment. Of the 4,472 cases of *yaws* treated during the year 2,862 were dealt with at Rural Dispensaries.

Leprosy.—Government provides financial assistance to the 12 clinics maintained by *Missions* ; grants are made in proportion to the number of cases treated. At these centres during the year 182 patients were admitted, 646 were treated as in-patients, 19 died, and 58 were treated as out-patients. In addition 46 lepers received in-patient treatment at Government Hospitals, and 139 as out-patients at hospitals and dispensaries. No exact information as regards the numbers of lepers in the territory is available, but observers are of the opinion the disease is increasing.

Deficiency diseases are the subject of a special note. During the year 43 cases of *pellagra* and 56 of *scurvy* were treated at various Government institutions. All the scurvy cases were reported from one district by a rural dispenser, but later enquiries failed to reveal any conditions which would confirm the diagnosis and it was concluded reports of these cases were inaccurate.

Four Special Reports are included as Appendices to the Annual Report under review ; they are as follows :—

(1) Dr. H. G. Fitzmaurice with "*Observations on the Native Foodstuffs and Diet in the Kota-Kota District*." This contribution describes in considerable detail foodstuffs available, methods of preparation, amounts eaten daily, etc. Anthropometric data relating to eleven illiterate schoolgirls are supplied. (2) Dr. H. D. Cronyn's contribution

is entitled "*Spinal Anaesthesia with Special Reference to its uses in Nyasaland.*" The advantages of spinal anaesthesia over inhalation anaesthetics are discussed; technique employed is described. In a series of 50 operations, 2 deaths occurred neither attributable to the anaesthetic. (3) Dr. W. H. Watson describes three "*Interesting Cases.*" (a) A case of *Gumma of the Cerebellum*, (b) *Coronary Obstruction simulating Thrombosis*, and (c) a case of *Tabes Dorsalis*. (4) Dr. D. P. Turner submits his "*Report of a Survey of the West Nyasa District.*" This exceptionally interesting and comprehensive study was briefly referred to in the section "Maternity and Child Welfare" above.

Scientific.—Dr. W. A. Lamborn, Medical Entomologist, made a tsetse fly survey in the Northern Province; he concludes that the recession of the fly from the Dowa and Fort Manning Districts has been maintained (see this *Bulletin*, 1937, Supp., p. 69*). Other surveys were directed to the discovery of the breeding places of the domestic species of flies in Zomba and Fort Johnston, and for mosquitoes of the *Aëdes* group and their near allies in the neighbourhood of the Chileka and Zomba aerodromes. In addition to sleeping sickness studies (see *Trypanosomiasis* above) other research investigations included work concerned with the transmission to man of *Treponema pertenue* by the fly *Musca sorbens*, and the problem of the transmission of leprosy through the agency of the haematophagous fly *Musca sorbens* and the bug *Cimex* species. During the year Dr. Lamborn published the following papers:—

"A possible Reservoir Host of *Trypanosoma Rhodesiense.*"—*Brit. Med. Jour.* 6th June, 1936.

"The Experimental Transmission to Man of *Treponema pertenue* by the Fly *Musca Sorbens*, Weid."—*Jour. of Trop. Med. and Hygiene*, 15th October 1936.

The Report of the Government Pathologist, Dr. H. M. Shelley, records that over 8,100 specimens were received and examined; these included 3,229 blood films, 1,482 faecal specimens, 1,143 urines, etc. (Findings briefly mentioned under *malaria*, *enteric fever*, *helminthiasis* in these notes.) The Sachs-Georgi test for syphilis proves reliable and shows a high incidence of correspondence with clinical observations, 170 tests out of a total of 372 proving positive. One hundred and eighty-seven specimens of blood from adult Africans were grouped (technique described) and three types determined; the incidence of the blood groups in 144 members of four Nyasaland tribes was tabulated.

Financial.—Total expenditure amounted to £48,035 as compared with the *approved* expenditure for the Department of £51,190.

P. Granville Edge.

SOMALILAND PROTECTORATE (1936).

Somaliland occupies the "North-eastern horn" of the African continent, jutting into the Indian Ocean on the south of the Gulf of Aden. The boundaries have been settled by agreements with France, Italy and Abyssinia. The chief ports are Berbera, Bulhar and Zeilah, and its area about 68,000 sq. miles, or one-sixth larger than England and Wales together.

Vital Statistics.—The estimated native population remains unchanged from the census figure of 1931, *viz.*, 344,700. No vital

statistics of any value are available, for the registration of vital facts is not generally observed. The system of notifying deaths to the medical authorities in Berbera and six other townships has failed to achieve its objects, for deaths are not reported and burials take place without examination. Efforts are being made to devise an efficient system. Mortality data relating to the seven townships are omitted from the Report under review.

European Officials resident numbered 77 with an average number resident of 43. Two were invalided and one death was recorded. It may be noted that Government Officials and their families constitute the entire European population of the Protectorate ; 37 non-official Europeans visited the country for business or pleasure during the year. *Asiatic Officials* resident numbered 68 with an average number resident of 56. One was invalided but no deaths were recorded within this group.

The following data relate to Troops and Police :—

Item	Number on strength	Average number on strength	Invalidings	Deaths	Remarks.
Troops S.C.C. (K.A.R.)	592	537	11[1]	4[2]	[1] Relapsing fever 1, unfit, 11. [2] Pneumonia 2, Suicide, Enteritis each 1.
Police	798 (includes 192 special and temporary Police)	694	11[1]	4[2]	[1] Pulmonary tuberculosis accounted for 6. [2] Pneumonia 2, diabetes and anaemia each 1.

Maternity and Child Welfare Work.—A few normal and abnormal labour cases are treated in the hospitals but there is no routine antenatal work done nor can anything be attempted in this direction without the appointment of a qualified woman worker (see this *Bulletin*, 1937, Supp., p. 76*).

School Hygiene.—There are no English schools and the proposed station schools under European supervision (see this *Bulletin*, 1937, Supp., p. 76*), are not yet established. Little can be done at present as regards routine inspection or instruction in the elements of hygiene.

Public Health, Sanitation, etc.—No major epidemics occurred during the year under review ; it was also a good pasture year, and the effect of this in the words of the Report " automatically reduces the average numbers of those dwelling in the larger townships and lessens the incidence of diseases due, primarily, to dietetic deprivation."

As regards general hygiene and sanitation it is stated that Berbera is the only township having a *water carriage system* with sewage disposal to individual septic tanks and even this system applies only to European quarters and specified institutions. In other townships disposal is by the *bucket system* for European and Asiatic Government quarters, while Indians, Arabs, and better-class Somalis living in permanent buildings usually have *pit-latrines* in the compounds of their houses. The bulk of the native population defaecate in the open

outside demarcated boundaries. In Berbera and certain other townships sanitation is under the control of the District Officer, medical officers assisting with technical advice and routine inspections; the system is necessitated by shortage of medical officers but is not wholly satisfactory. The single Asiatic Sanitary Inspector stationed in Berbera controls the sweepers who endeavour to maintain a superficial cleanliness of the town.

Berbera is provided with piped *water supplies* (see this *Bulletin* 1933, p. 70* Supp.), but the water though bacteriologically pure is scarcely potable by reason of its salinity, permanent hardness, unpalatable taste and laxative action; European residents either install their own water softeners or obtain fresh drinking water from a source 25 miles distant. Pumped supplies have been installed at Sheikh, Burao, and Hargeisa.

The general conditions of *housing* have been summarized in previous issues of this Supplement (see this *Bulletin*, 1933, Supp., p. 70*). The medical department exercises very little control over the siting and erection of new buildings, but attention is always paid to matters affecting individual or public health.

As regards *food* it is stated the native appears to be showing a more general tendency towards the consumption of such vegetables as onions. Diseases directly attributable to food contamination are said to be uncommon; the ever present danger of undulant fever is emphasized, the issue of goats' milk to Government institutions discouraged, and consumers advised to ensure careful boiling of the milk before use.

Hospitals, Dispensaries, etc.—It is stated that established hospitals are in the main adequate for the purposes they serve, though some are in bad state of repair and new premises will have to be provided in the near future. The record of work at these centres of treatment reads as follows :—

Hospital	In-patients	Hospital Deaths	Out-patients
Berbera	645	15	13,976
Borama	368	3	5,137
Burao	982	19	10,304
Erigavo	158	3	4,370
Hargeisa	590	15	8,815
Sheikh	25	1	2,519
Zeilah	76	1	4,026
Totals	2,844	57	49,147

As compared with the records of the preceding year a small decrease in the numbers of in-patients but a slight increase in out-patient cases is noticeable. In this connexion it may be noted that in the early part of 1936 a small charge was imposed for in-patient treatments; this was not altogether popular and may have had the effect of encouraging out-patient attendances. On the other hand 1936 was a comparatively healthy year, free from major epidemics, and the fall in the numbers of in-patients may be held to reflect in part at least the better conditions of living prevailing during the year under review.

Hospital figures however can only tell part of the story, for the great medical problem in Somaliland is how to reach the nomadic people in distant grazing areas. It is suggested the solution might be found in the establishment of mobile dressing stations staffed by properly trained natives.

The notes which follow briefly summarize the principal diseases dealt with during the year and commented upon in the pages of the Report under review :—

Malaria cases were considerably fewer, 677 as compared with 1,151 during the preceding year. Of the total cases 560 were treated as in-patients, types of infection being distributed as to *P. vivax* 90, *P. malariae* 64, *P. falciparum* 396, and 10 malarial cachexia ; 3 deaths were ascribed to malaria. Though the disease did not assume serious epidemic proportions in any part of the Protectorate, it is endemic in many areas ; the recorded figures are no reliable indication of the prevalence of the disease, for only a small proportion of those infected are able to travel the long distances from their homes to hospital centres. Of these people, it is added " they have not learned that quinine will cure the disease much more effectively than the prayers of a *Mullah* or a Koramic amulet strung round the neck." The usual routine measures concerned with the oiling of wells and standing water, drainage, etc., were actively continued. At the Laboratory, where 4,366 blood films were examined, 76 were positive for *P. vivax*, 100 for *P. malariae*, and 442 for *P. falciparum*.

Relapsing fever appears to show a steady increase in the numbers of cases. During 1936, persons treated for the disease numbered 902 as compared with 843 in 1935 ; of the total, 309 were in-patients and one died. In a special Appendix to the Annual Report, Dr. E. M. Clark contributes a special survey of the disease in some detail. It is stated that relapsing fever was introduced from Abyssinia and from 1916 continued to spread across the Protectorate. The town of Burao shows a particularly unenviable experience with a rapid increase from a single case in 1927 to 618 in 1936, with a further increase expected in 1937 unless special steps are taken to combat the disease. According to Dr. Clark only about 50 per cent. of patients receive hospital treatment ; among these the disease is mild in type with a mortality of about 0·6 per cent. Among untreated cases mortality is probably higher, and in the opinion of Dr. Clark from 50–100 persons die from this disease in Burao each year. One curious feature of incidence is that the numbers of cases are greatest between April and September each year when the population of the town is at its lowest level. Control could be made effective by the provision of well-built brick buildings with plaster walls, concrete floors and good roofs, but without considerable expenditure it is difficult to know how the problem is to be solved. Meanwhile improvements have been effected by tick-proofing some of the houses in Burao.

Smallpox was prevalent mainly in the Burao district and to a lesser extent in Barama ; the disease, which was of a mild type, made its appearance during the early months of the year but no case occurred after September in any district. Hospital records refer to 156 in-patient cases with 7 deaths. The outbreak was controlled by energetic vaccination and segregation, 8,337 vaccinations being performed. The practice is observed of vaccinating all people from the interior before allowing them to enter the larger townships.

Tuberculosis (all forms) was responsible for 70 in-patient and 330 out-patient cases; among in-patients there were 8 and among out-patients 155 cases of the pulmonary form of the disease. The Report observes "only relatively few active cases are actually treated in the hospitals." Persons suffering from and treated for *bronchitis and broncho-pneumonia* numbered 989 and *pneumonia* 65, and among the latter 9 hospital deaths occurred.

Two non-fatal cases of *typhoid fever* received in-patient treatment and there were also three non-fatal cases of *dysentery*, one of these being the amoebic form of the disease. Hospital returns also show that 470 persons received treatment for *enteritis* (with 5 deaths) and no less than 10,634 for *constipation*. The latter condition is said to be very common in the townships, but even more common in the interior, where camels' milk is a principal item of diet.

At the beginning of the year there were 29 *lepers* in the special Leper Camp in Berbera; during the year 7 were admitted, 4 were discharged as non-infective and one died, leaving 31 inmates on the register at the end of the year. The Camp in Berbera is not entirely satisfactory, and it is recommended that the settlement should be moved to a semi-agricultural area and established on modern lines.

With regard to *helminthic diseases* it is stated "the indigenous population of Somaliland is, as it always has been, free from the common helminths." The 310 cases of tapeworm infestation treated during the year occurred among political refugees from across the Ethiopian frontier, where the natives are beef-eaters and where the infestation rate is high. Strict sanitary precautions are designed to deal with the risks of spread of helminthiasis in the Protectorate.

In the return of *venereal diseases* there appear 434 cases of *syphilis*, 183 of *gonorrhoea*, and 9 of *soft chancre*.

As would be expected in a dry and dusty country *eye ailments* are very prevalent and 3,812 persons received treatment for eye affections of various kinds. Of the total 3,043 received treatment for *conjunctivitis* and 213 for *cataract*. *Trachoma* though met with is not common; 62 cases are reported in hospital returns.

Among *other ailments* treated it may be noted that while *ulcers* of the true tropical type are said to occur in fair numbers, a very large proportion of the 7,728 cases treated under this title were really shoe-galls or slight abrasions in the feet. Under "*external causes*" appear records of 7,316 cases of various kinds, 4,792 of these being due to "*injury by blow*." One case of *tick typhus* was diagnosed in a European Officer. No case of *rabies* was recorded during the year.

Scientific.—The Laboratory Report for 1936 tabulates the list of specimens received, and examined; these totalled 5,584, and of the total 4,366 were blood films (see above under *malaria*), and 258 were specimens of sputa of which 143 were positive for *B. tuberculosis*.

Financial.—Total expenditure on medical services amounted to £10,496, a sum which represents 6·7 per cent. of the total revenue or 5·3 per cent. of the total expenditure of the Protectorate during 1936.

P. Granville Edge.

Fiji and Western Pacific (1936).

The Colony of Fiji comprises some 200 to 250 islands of volcanic origin in the south Pacific Ocean (many merely uninhabited islets and rocks), lying between 15° and 22°S. latitude and longitudes 177°W. and 175°E. Sydney is about 1,700 miles distant and Auckland 1,100 miles. The Tongan or Friendly Islands lie 180 miles to the south east and Samoa 500 miles to the north-east. The principal inhabited islands are Vitilevu with an area of 4,053 sq. miles, Vannalevu 2,130 sq. miles, Tavenui 217, Kadavu 124, Koro 58, Gau 45, Ovalau 43, Rotumah 14 sq. miles. The total area of the Colony is 7,083 sq. miles (nearly that of Wales).

Vital Statistics.—The principal vital statistical facts for the year under review are as follows :—

Race	Population	Births	Birth Rate	Deaths	Death Rate	Infant Deaths	I.M.R.
Europeans	4,159	64	15·4	33	7·9	2	31·3
Half-Castes	4,646	160	34·4	52	11·2	10	62·5
Fijians ...	98,291	3,715	37·8	2,755	28·0	522	140·5
Rotumans	2,844	109	38·3	67	23·6	16	146·8
East Indians	86,778	3,484	40·2	1,069	12·3	283	81·2
Polynesians	1,462	26	17·8	45	30·8	2	76·9
Chinese ...	1,792	20	11·2	15	8·4	?	?
Others ...	1,114	56	50·3	20	18·0	3	53·6
Totals ...	201,086	7,634	38·0	4,056	20·2	838	109·8

The higher *general death rate* was due chiefly to dysentery, enteric fever, and pneumonia, and the increased *infant mortality* to epidemics of mumps, measles, whooping cough, and dysentery. These causes are commented upon below.

European Officials resident numbered 361 and an average number resident of 336. Twelve invalidings and one death were recorded. *Native Officials* resident numbered 569 and the average number resident 529. Two invalidings and two deaths occurred within this group.

Maternity and Child Welfare Work.—The Obstetric Ward of the Colonial War Memorial Hospital reports a busy and successful year ; 230 births are recorded—an appreciable increase in attendances at the ante-natal clinic is noted ; during the year patients numbered 65 and attendances 168 (see this *Bulletin*, 1937, Supp., p. 211*). The usual training of native Obstetric Nurses was continued with 20 pupils taking the course.

Child welfare work progresses steadily and working Committees are now established in practically every village. Employed in this work are four trained European and 14 Native Nurses, while District Medical Officers and Native Medical Practitioners co-operate with all those engaged. It is stated that at Child Welfare Centres special attention is devoted to the treatment of scabies and other skin conditions formerly so prevalent among children in Fiji.

School Hygiene.—Medical inspection of the children attending the three schools previously described (see this *Bulletin*, 1937, Supp., p. 211*) was carried out as usual during the year ; the following notes briefly summarize the principal findings during the course of these inspections.

Girls' Grammar School.—Out of 188 pupils examined 102 had carious teeth, and 94 enlarged tonsils, in several cases accompanied by enlarged cervical glands. Throat swabs taken at random revealed one positive for diphtheria and several yielded growths of the non-haemolytic streptococcus, staphylococcus aureus, and streptococcus viridans. At the *Boys' Grammar School* where 103 pupils were examined, 39 had carious teeth, 38 enlarged tonsils, 17 cases showing enlarged cervical glands. Throat swabs revealed no diphtheritic condition. *At Queen Victoria School* 56 pupils were examined, 22 had carious teeth, inoculation against typhoid was carried out, and stools were examined. At the Boys' Grammar School and Queen Victoria School epidemics of mumps occurred. The question of diet for European and other children in Fiji is to be investigated.

Public Health, Sanitation, etc.—From the public health point of view the year was not a good one, the death rate being the highest for some years past. During 1936 new Public Health Regulations were drafted with the object of condensing and simplifying the numerous existing Bye-Laws and Regulations. It is hoped these new Regulations will receive the approval of Government and soon become law ; the new sanitary code if energetically applied should ensure considerable improvement in existing sanitary conditions. In view of the importance and recent development of the gold-mining industry and the necessity to safeguard the health of those engaged in the Fiji mines, *silicosis* was added to the list of compulsorily notifiable diseases during the year.

As regards general *hygiene and sanitation* in the Colony, the Report confines attention to activities in the Suva Rural Sanitary District. As regards *sewage disposal* in that area it is noted that the 2,445 recorded buildings (of which 2,350 are private dwellings), 2,064 are served by cement slab latrines and 218 by septic tanks ; only 9 are unprovided with adequate sanitary conveniences. The Suva *Garbage Disposal* Bye-Laws 1936, effectively control the disposal of refuse, etc., in the Urban Sanitary District. Of the 2,445 buildings in the rural district, 878 have piped *water supplies*, 420 have tank supplies, 215 depend on river water, 766 are served by protected and 166 by unprotected wells. It is proposed to install a chlorinated and filtered pipe-borne water supply system throughout the Suva-Rewa area.

Systematic house-to-house inspections and re-inspections continued to be made by the sanitary staff throughout the year, and various sanitary improvements insisted upon. Fiji continues to be a non-malarial country and the authorities take the most stringent precautions to prevent the introduction of anopheline mosquitoes.

The *Town Planning and Building* Regulations are gradually improving the appearance of the business area. Dwelling-houses must be erected in accordance with the requirements of the Building Bye-Laws. A complete survey of Suva is to be carried out so that a comprehensive town-planning scheme might be formulated.

Port Health Work.—The usual routine duties continued to be carried out as previously described (see this *Bulletin*, 1937, Supp., p. 212*). During the year 147 incoming vessels were boarded and 3,785 passengers and 2,662 members of crews were medically inspected. In December all the 578 Indian immigrants arriving from Calcutta were placed in quarantine ; no sickness occurred and quarantine was lifted after four days. Of the 2,621 rats trapped in the port area, 1,976 were

R. norvegicus and 645 *R. rattus*; 564 carcases were examined at the Laboratory where all were negative for *P. pestis*.

Hospitals, Dispensaries, etc.—Among other items of interest in this section of the Report it is noted that provision of £20,000 is to be made for the erection of new hospital buildings. Other schemes envisage the reorganization of the Staffs of European and Native Nurses, and the possibility of establishing a School of Public Health providing facilities for the training of Native Medical Practitioners, Native Nurses, and Fijian and Indian Sanitary Inspectors. With the exception of Lautoka Hospital, the work at all other hospitals continues to increase; the relevant facts read as follows :—

Hospital	In-patients	Deaths	Out-patients
Colonial War Memorial	3,074	228	17,330
Lautoka	2,055	116	6,797
Levuka	304	30	4,066
Lambasa	763	36	8,383
Provincial and Plantation Hospitals, etc.	3,849	344	54,048

Native Medical Practitioners in charge of dispensaries treated 42,171 cases and recorded among their patients 293 deaths.

According to Appendix B of the Report there are 56 hospitals and dispensaries in the Colony. It is by no means easy from the printed list to differentiate between hospitals and dispensaries, but there would appear to be 16 of the former exclusive of Mission Hospitals, etc. In the text of the Report references to diseases treated during the year include the following :—

Reported cases of *enteric fever* numbered 188. Of these 38 occurred in Rewa District, 32 in Mba and Tavua and 27 in Suva Rural Sanitary District, all these areas being on the main island of Viti Levu. The provision of an adequate and purified water supply would lead to a substantial decrease in the incidence of the disease (see comments under "*Public Health*" above). Of the total cases recorded 50 received treatment in the Colonial War Memorial Hospital with 11 deaths, and 131 in other hospitals with 17 deaths. At the Laboratory 32 out of 240 specimens examined were positive for *Bact. typhosum*.

Dysentery, chiefly of the Shiga variety, was again prevalent with a considerably increased incidence and mortality. Altogether 1,745 cases with 148 deaths were reported, 400 cases in the first, 492 in the second, 337 in the third, and 516 in the fourth quarters of the year respectively. The north-western area of the main island of Viti Levu was principally affected, and from the Rewa district alone 397 cases were reported. It is believed the prevalence of the disease is less due to defective soil sanitation than to polluted water supplies, and that the provision of piped supplies should eliminate these seasonal epidemics of bacillary dysentery. Among 772 faecal specimens examined at the Bacteriological Laboratory 64 were positive for Shiga's bacillus, 40 for Flexner, 23 Schmitz, 8 Sonne, and the protozoon *E. histolytica* was found in 6.

Clinically, *diphtheria* is said to be a rare disease in Fiji. During the year 21 cases were reported and from these the Klebs-Loeffler bacillus in more or less pure culture was isolated. Of *smallpox* no cases appear to have occurred, but 3,500 persons were vaccinated against the disease. Under the heading "*Scientific*" below, reference

is made to a report on the results of vaccination with dried calf lymph. An epidemic of *influenza* swept through the Colony during the year and gave rise to 1,358 cases; on the whole the disease was of a mild type. *Measles* in epidemic form was present throughout the Group and 3,328 cases were notified with a practically *nil* mortality. It is interesting to note that since the tragic epidemic of 1875 the Fijians appear to have acquired a certain immunity against the disease.

Five cases of *epidemic dropsy* were reported, four of these from the Suva Gaol, though it is stated none of the gaol cases were definitely proved to have been due to dietetic deficiency.

Tuberculosis (all forms) was responsible for 280 cases with 59 deaths and of the total cases recorded 225 were due to the *pulmonary* type of the disease, while of these pulmonary cases 138 occurred among Fijians. Dr. LAMBERT, local Director of the Rockefeller Foundation, proposes making a tuberculosis survey of the Colony. There were 409 cases of *pneumonia* with 139 deaths, this serious increase in incidence and mortality being attributed to the epidemics of measles and influenza during the year.

Ankylostomiasis (see this *Bulletin*, 1937, Supp., p. 214*) is a notifiable disease; during the year 371 cases were notified and 6,351 persons were treated with carbon tetrachloride and tetrachlorethylene. The *Megarhinus splendens* imported in 1932 and bred through several generations by the Health Department have been liberated throughout the Colony; it is hoped these mosquitoes will have a marked effect in reducing the numbers of *Aëdes variegatus*, the usual intermediary of *filaria*.

In the list of infectious diseases notified 352 cases of *venereal diseases* are quoted, 277 of these occurring among Indians. At the Colonial War Memorial Hospital 6 patients were treated for *syphilis*, and 22 for gonococcal infections, and at other hospitals, 20 for syphilis and 97 for gonococcal infections. Notified cases of *yaws* numbered 3,198 and 7,500 injections of N.A.B. were given during the year.

Leprosy.—The Government Leper Station on the island of Makongai completed its jubilee anniversary during the year under review. Dr. C. J. AUSTIN, Medical Superintendent of the Leper Hospital, once again contributes a comprehensive and interesting account of the work, the first part of his Report being devoted to a short historical account of the development of the institution from the time of its inauguration in 1911. Since that year over 2,000 patients have been admitted.

At the beginning of the year under review there were 575 patients on the books, 60 new patients were admitted during the year (these included 37 Indians and 15 Fijians), 54 died, 20 were conditionally discharged and 6 were repatriated, leaving 555 patients resident at the end of the year. It is noted that 44·2 per cent. of the Fijians were neural cases as compared with 32·2 per cent. among Indians, and that 20·3 per cent. of the Fijians were advanced cutaneous cases while only 3·1 per cent. of the Indians reached that stage. This Report discusses at length such matters as treatment and results of treatment, race and type of leprosy related to progress, sex influences on incidence and prognosis, and other items of interest to leprologists.

Other *Special Reports* featuring the Annual Report under review include the following:—

(*a*) The Report of Dr. T. CLUNIE, who describes the work at the Colonial War Memorial Hospital; Dr. F. WIDLAKE deals with the activities of the X-ray Department at the same institution.

(*b*) Dr. B. W. HOODLESS contributes an account of the year's work at the Central Medical School, Suva, where 40 medical students were in residence and three qualified Native Medical Practitioners attended post-graduate courses. At the usual final examinations held in 1936 ten out of eleven candidates were successful.

Scientific.—The work of the Pathological and Bacteriological Laboratory is dealt with by Dr. C. M. MACPHERSON. The outstanding event of the year was the completion and occupation of the fine new modern Pathological, Bacteriological and Biochemical Laboratories in which research work and scientific investigation can be satisfactorily carried out. Funds to assist in the erection and equipment of these laboratories were most generously contributed by the Rockefeller Foundation. A full description of the premises and equipment, together with photographs of the exterior and of interior units, is contained in the Report by Dr. Macpherson.

With regard to Laboratory work during the year, of the 6,124 specimens received and examined, 1,531 were stool specimens examined for the presence of helminths, and of these 23·7 per cent. were positive for *hookworm*, 6·5 per cent. *trichuris*, 5·6 per cent. *ascaris*, and 2·8 per cent. *oxyuris*. Kahn tests numbered 373 and throat swabs for K.L.B. 562.

Dr. C. H. B. THOMPSON, Medical Officer of Health, contributes a paper entitled "*Results of Vaccination with the Dried Calf Lymph supplied by the Pasteur Institute, Java.*" A total of 359 vaccinations was performed with the available lymph with 92·5 positive reactions. In view of these encouraging results it is recommended that the solid lymph be given an extended trial in Fiji and if the so far favourable results are confirmed, the new form of lymph be used in preference to that normally used as being more efficient and economical.

Financial.—Of the total revenue of the Colony £81,085, or 8·4 per cent., was expended on Medical Services during 1936.

P. Granville Edge.

REVIEWS AND NOTICES.

CHELLAPPAH (S. F.) [O.B.E., M.R.C.S. (Eng.), L.R.C.P. (Lond.), etc.] & JACOCKS (W. P.) [M.D., Dr. P. H.]. **A Guide to Health Unit Procedure in Ceylon.**—88 pp. With 1 plan. 1937. Colombo: Ceylon Govt. Press. [Review appears also in *Bulletin of Hygiene*.]

Dr. Chellappah, the Assistant Director of Sanitary Service, and Dr. W. P. Jacocks, Representative of the International Health Division of the Rockefeller Foundation, have supplied, in this publication, a very full description of the organization of the Ceylon Health Unit System. There is little doubt that a detailed account of the functions and activities of these units will be welcomed by a much wider circle than the workers in Ceylon, for whose information this Guide is primarily intended.

In the first part of the Guide the subjects discussed are selection of the first area, co-operation with the inhabitants, personnel, technical staff, duties procedure, organization, administration, survey and education. A description is given of the methods of recording vital statistics, and the results of epidemiological investigations. The latter apply mainly to the detection and prevention of smallpox, plague, cholera, diphtheria, typhoid fever, dysentery, ankylostomiasis, malaria, tuberculosis and leprosy. The section on Sanitation includes the local recommendations and practice with regard to water supplies, sewage disposal, refuse disposal, food sanitation, control of animals including insects, and housing. There are sections on Maternity and Child Welfare procedure, School Health Work and the Laboratory Service. The importance of the staff keeping diaries, of working to a planned programme, of forwarding regular reports and of attending the weekly staff conferences, is emphasized. In introducing a specimen budget of a unit, the methods of allocating the cost between the Central Government and the Local Authority are discussed.

In appendices samples of the numerous forms required for the work are shown, organization chart, survey card, and many others which include such diversities as Maternity and Child Welfare cards, dosage tables for hookworm treatment, and instruction for composting. A list of forms and statements—well over a hundred—used in the Health Unit work is given in appendix 3, the standard list of sixteen registers and their forms in appendix 4. A list of the 107 files required is in appendix 6. The technical and clerical methods of recording other unit activities are dealt with in a similar detailed manner.

It is not quite clear, in what respects, other than size, the Health Unit differs from what the ordinary public health service would be, if it were really operative throughout the whole country. The aims and scope are those of any normal Public Health Service, *e.g.*, reliable vital statistics, notification of communicable diseases, maternity and child welfare, school health work, and a laboratory service. It utilizes the same type of personnel, medical officers of health, sanitary inspectors, public health nurses, midwives and so on. The distinction may lie to some extent in the special emphasis laid on adaptation for rural areas, the insistence on achieving the active and voluntary participation of the people concerned, and the provision that "the unit may be regarded as an area for testing methods of procedure."

The effect of establishing, in a selected locality, a fully equipped miniature public health service is that the local population receives,

immediately, benefits which might take years to reach them at the present rate of development. A corollary of this is that those regions not fortunate enough to be selected for health unit work will have to wait still longer than they normally would, before receiving their average share of public health improvement, unless special outside funds, not hitherto available and used for public health, are provided.

If the staff figures of the Ceylon Health Unit were applied to Nigeria, regarding its whole population, for the purposes of argument, as rural or semi-rural, the following would be required :—

Medical Officers of Health	500
Sanitary Inspectors	2,500
Public Health Nurses	2,500
Midwives	5,000

in addition to a staff of office clerks and labourers.

The Health Officer in any country will naturally wish to know how his difficulties have been overcome in other parts of the world. True, he may decide that the Health Unit System is not the particular form of organization most suitable for his territory. Nevertheless, in arranging his programme for particular rural areas, he will find the possession of " A Guide to Health Unit Procedure in Ceylon " of very great service. *D. B. Blacklock.*

Nicholls (Lucius) [M.D., B.C., B.A. (Cantab), Director of Bacteriological and Pasteur Institutes, Ceylon, etc.]. **Tropical Nutrition and Dietetics.**—pp. xi+164. With 9 figs. (4 on 2 plates). 1938. London : Baillière, Tindall & Cox, 8 Henrietta Street, Covent Garden, W.C.2. [7*s.* 6*d.*] [Review appears also in *Bulletin of Hygiene.*]

This book is meant primarily for medical men who work among the masses in the tropics and its object is to give a brief account of the general principles of nutrition and to collect data referring to foods and deficiency diseases of the tropics. The author is well qualified to write such a book for he has by his researches contributed much to the knowledge of nutrition in Ceylon.

The first half of the book is concerned with an elementary treatment of the components of the complete diet—carbohydrates, proteins, fats, minerals and vitamins. A good deal of space is here taken up with structural formulae of the compounds described, and the reviewer feels that in a book of this size and scope these formulae might have been omitted and replaced by more detailed treatment of other aspects, such as the determination of the biological value of proteins. This view is strengthened by the fact that of the 15 amino acid formulae given, there are small mistakes in 5, and all of the three vitamin structural formulae given contain errors or omissions. In discussing the addition of iodine to drinking water and table salt, it is stated that " the procedure is harmless because it is unnecessary to add the iodide to the water or salt in a proportion greater than 1–50,000." It should perhaps be made clear that this figure refers to the salt, not to the drinking water [where the figure would be nearer one in a hundred million]. In dealing with vitamin B_1, under the heading International Unit, a unit which is not the international one is described.

The second part of the book is concerned with the application of general nutritional knowledge to the special conditions of the tropics.

The calorie requirements recommended for temperate climates by the League of Nations Committee are scaled down for the tropics to a value, for example, of 2,600 calories for an adult male, and the daily protein and Ca requirements are given as 65 gm. and 0·75 gm. respectively. Useful examples of the assessing of the food values of diets are given and of means of improving diets by suitable additions. In many cases, the main difficulty in improving diets is the impossibility of obtaining milk. Incidentally, the danger is pointed out of condemning "toddy" or native beer (containing yeast) unless an adequate amount of vitamin B complex can be assured in the diet.

Probably the most valuable part of the book is a series of tables giving the analyses and vitamin values of common foodstuffs, particularly those grown in India, Malaya, Java and Ceylon. Most of these foodstuffs do not appear in the ordinary food tables, and many workers will be grateful to the author for collecting and displaying so clearly this mass of data.

Other chapters in the book deal with signs and symptoms of common deficiency diseases, nutritional surveys, food poisoning, etc. A series of appendices gives methods of vitamin estimation, instructions for dietary inquiries, a specimen school inspection form and a description of the A.C.H. index of nutrition.

There is no question that doctors and other workers concerned with studying and improving the diet of the peoples in the tropics will do well to acquire this book, both to read and to keep at hand for reference purposes. *Douglas C. Harrison.*

Schmidt (Hans) & Peter (F. M.). **Advances in the Therapeutics of Antimony,** with a Preface by Dr. Philip Manson-Bahr, C.M.G., D.S.O., M.D., F.R.C.P.—pp. x+257. With 10 diagrams. 1938. Leipzig: Georg Thieme. [Unbound *Rm.* 18; Bound *Rm.* 19·50.]

Readers of the *Bulletin* will welcome this edition of Professor Schmidt's and Dr. Peter's comprehensive work on the therapeutic uses of antimony compounds. The German edition published in 1937 was reviewed in this *Bulletin* (1937, Vol. 34, p. 669) and the changes are not sufficient to call for another review. Beyond appealing to a wider circle of readers this English edition has been slightly amplified—it is some thirty pages longer—the literature has been brought up to the end of last year and a useful list of authors is now added. Dr. Manson-Bahr has contributed a short but most interesting preface to the new edition. The name of the translator is nowhere stated. This is a pity, for the work has been most excellently done—a rare accomplishment. *H. H. S.*

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